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# SOIL SURVEY

# Forsyth County Georgia

OUR SOIL ★ OUR STRENGTH

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
GEORGIA AGRICULTURAL EXPERIMENT STATIONS

# HOW TO USE THE SOIL SURVEY REPORT

THIS SURVEY of Forsyth County will serve several groups of readers. It will help farmers in planning the kind of management that will protect their soil and provide good yields; it will assist engineers in selecting sites for roads, buildings, and other structures; and it will add to the soil scientist's knowledge.

In making this survey, soil scientists walked over the fields and woodlands. They dug holes and examined surface soils and subsoils; measured slopes with a hand level; noticed differences in the growth of crops, weeds, and brush; and, in fact, recorded all things about the soil that they believed might affect suitability for farming, engineering, forestry, and related uses.

The scientists plotted the boundaries of the soils on aerial photographs. Then cartographers prepared from aerial photographs the detailed soil map in the back of the report. Fields, woods, roads, and many other landmarks can be seen on the map.

## Locating the soils

Use the index to map sheet to locate areas on the large map. The index is a map of the county on which numbered rectangles have been drawn to show where each sheet of the map is located. When the correct sheet of the large map is found, it will be seen that boundaries of the soils are outlined and that there is a symbol for each kind of soil, wherever it appears on the map. Suppose, for example, an area located on the map has the symbol CcB. The legend on the detailed map shows that this symbol stands for Cecil sandy loam, very gently sloping phase. This soil and all others mapped in the county are described in the subsection, Soil Series, Types, and Phases.

## Finding information

Few readers will be interested in all the report, for it has special sections for different groups. The section, General Nature of the Area, which discusses geology, climate, water supply, and other subjects, will be of interest mainly to those not familiar with the county.

*Farmers and those who work with farmers* can learn about soils in the subsection, Soil Series, Types, and Phases, and then go to the section, Use and Management of Soils. In this way they first identify the soils on their farm and then learn how these soils can be managed and what yields can be expected. The soils are grouped in capability units; that is, groups of soils that need similar management and respond to this management in about the same way. For example, in the subsection, Soil Series, Types and Phases, Cecil sandy loam, very gently sloping phase, is shown to be in capability unit IIe–1. The management needed for this soil, therefore, will be found under the heading, Capability Unit IIe–1 in the subsection, Management by Capability Units.

*Soil Scientists* will find information about how soils were formed and how they are classified in the section, Formation, Classification, and Morphology of Soils.

*Foresters* will find general information on woodland management in the subsection, Woodland Management. Information on the suitability of the soils for trees is in the subsections, Soil Series, Types, and Phases, and Management by Capability Units. In table 1 are site indexes for three species of pine for each soil in the county.

*Engineers* will find information useful for their work in the subsection, Soil Series, Types, and Phases and in the section, Engineering Applications.

*Students, teachers, and other users* will find information about the soils and their management in various parts of the report, depending on their particular interest. Those interested in general soil areas will want to read the section, General Soil Areas. This section tells about the principal kinds of soils, where they are found, and how they differ from one another.

★ ★ ★

Fieldwork for this survey was completed in 1956. Unless otherwise indicated, all statements in the report refer to conditions in the county at that time. This survey was made as a part of the technical assistance furnished the upper Chattahoochee River Soil Conservation District, of which Forsyth County is a part. Help in farm management can be obtained from members of the Soil Conservation Service in the county, the county agricultural agent, and the staff of the Georgia Agricultural Experiment Stations.

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# SOIL SURVEY OF FORSYTH COUNTY, GEORGIA

SOILS SURVEYED BY S. M. ROBERTSON, DAN D. BACON, CARL B. LAWRENCE, HUGH T. DAVIS, J. P. KNIGHT, AND FORREST STEELE, SOIL CONSERVATION SERVICE

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UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH THE UNIVERSITY OF GEORGIA, COLLEGE OF AGRICULTURE, AGRICULTURAL EXPERIMENT STATIONS

FORSYTH COUNTY is in north-central Georgia (fig. 1). Its area of 243 square miles, or 155,520 acres, is rather sparsely populated. The main staple field crops were at one time cotton and corn, but since 1940 much of the cropland has been seeded to pasture. In recent years the broiler industry has become the main agricultural enterprise, and its income surpasses that of all others. This soil survey was made to provide a basis for the best agricultural use of the land.

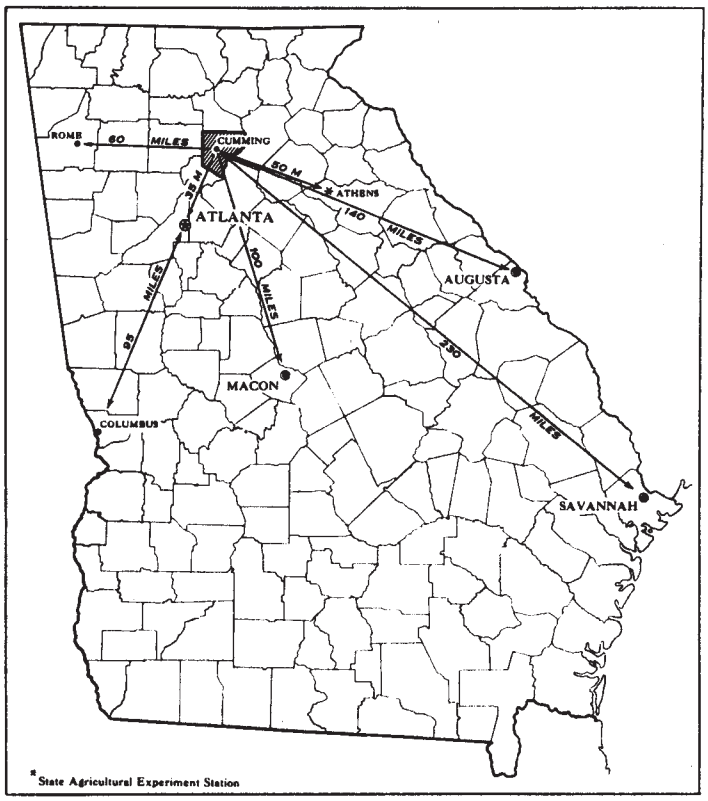


*Figure 1.*—**Location of Forsyth County in Georgia.**

## General Soil Areas

In mapping a county or other large tract, it is fairly easy to see definite differences as one travels from place to place. There are many obvious differences in shape, gradient, and length of slope; in course, depth, and speed of streams; and even in kinds of agriculture. With these more obvious differences, there are less easily noticed differences in patterns of soils. The soils differ along with the other parts of the environment.

By drawing lines around the different patterns of soils on a small map, one may obtain a map of general soil areas, or, as they are sometimes called, soil associations. Such a map is useful to those who want only a general idea of the soils, or wish to compare different parts of the county, or want to locate large areas that are suitable for some broad land use. The five general soil areas, or kinds of soil patterns, in Forsyth County are shown in colors on the general soil map at the back of this report. Descriptions of these areas follow.

### 1. *Well-drained, gently sloping and sloping soils on uplands: Cecil-Madison*

This general soil area makes up about 74 percent of the county. Cecil sandy loams and Madison fine sandy loams are the dominant soils, and Lloyd soils occur in small areas. The dominant soils have a red, permeable, clay loam subsoil and are deep to bedrock. Most of the area is well drained and gently sloping, but along the deeper drainways are a few areas of strongly sloping soils. Along and at the head of other drainways are a few small areas of well drained to poorly drained soils on local alluvium or colluvium.

A good part of this general area is cleared and used for crops and pasture. The soils are well suited to corn, cotton, small grain, and legumes and grasses. Much of the area consists of soils in capability classes II and III.

### 2. *Well-drained, sloping and moderately steep soils on uplands: Cecil-Louisa*

This general soil area makes up about 9 percent of the county. The dominant soils are Cecil fine sandy loams that occupy sloping interstream areas. Louisa fine sandy loams are in the steeper areas next to drainways. The Cecil soils have a red, permeable, clay loam subsoil, and the Louisa soils have a red, micaceous subsoil. These soils are susceptible to severe erosion. The Louisa soils are generally more severely eroded than the Cecil soils.

Most of this general soil area is used for forest that produces pulpwood and a little saw timber. The wooded acreage has been cut over, and the acreage that was once cleared has revegetated to pines. Most of the area consists of soils in classes IV and VI, but some of the area is in classes III and VII.

3. *Well-drained, sloping and moderately steep soils on uplands: Cecil-Habersham*

This general soil area makes up about 9 percent of the county. It occurs in the central and eastern parts of the county in four separate sections. The Cecil and Habersham are the dominant soils. The Cecil soils occupy the lower, sloping areas, and the Habersham soils are on the higher, steeper areas that are underlain by resistant quartzite. In most places the Habersham soils are stony and have a weakly developed B horizon. The Cecil soils have A horizons that are thick in some places because they have small amounts of colluvium. They are permeable and generally contain more sand throughout the profile than Cecil soils in other parts of the county.

Most of this general soil area is in pasture or woods. The soils are mainly in capability classes IV, VI, and VII.

4. *Well-drained, sloping and moderately steep soils on uplands: Madison-Louisa*

This general soil area makes up about 3 percent of the county. The Madison and Louisa soils are dominant and have about equal total acreages. The Madison soils are on the sloping, interstream divides, and the Louisa soils are on the steeper slopes along drainways. These soils have a fine sandy loam surface soil in places that are not eroded, and a red clay loam subsoil.

A large part of this general soil area was cleared and, at one time, used for crops and pasture. This acreage, however, has been abandoned and has reverted to pines. Because this general area is very susceptible to erosion, little of it is suitable for cultivation. It consists mostly of soils in capability classes IV, VI, and VII.

5. *Moderately well drained or well drained, level or gently sloping soils on flood plains and terraces: Congaree-Wickham*

This general soil area makes up about 5 percent of the county. It consists mainly of Congaree and Wickham soils, which occur along the larger streams on bottom land and terraces. Most of this area is cleared and cultivated. It consists mostly of soils in capability class II.

# *Use and Management of Soils*

This section consists of three main parts. In the first part, after the nationwide system of capability classification is described, the soils of the county are placed in capability units, or management groups, and management is suggested for each group of soils. The second part consists of a table that gives for each soil estimated yields for crops and pasture under two levels of management and site indexes for three species of pine. The third part discusses woodland management.

## Capability Groups of Soils

Capability grouping is a system of classification that is used to show relative suitability of soils for crops, grazing, forestry, or wildlife. It is a practical grouping based on the needs and limitations of the soils, the risk of damage to them, and also their response to management. There are three levels above the soil mapping unit in this grouping. They are the capability unit, subclass, and class.

The capability unit, which can also be called a management group of soils, is the lowest level of capability grouping. A capability unit is made up of soils similar in kind of management they need, in risk of damage, and in general suitability for use.

The next broader grouping, the subclass, is used to indicate the dominant kind of limitation. The letter symbol "e" indicates that the main limiting factor is risk of erosion if plant cover is not maintained; "w" means that excess water retards plant growth or interferes with cultivation; "s" shows that the soils are shallow or droughty, or that they have low fertility that is difficult to correct. In some areas there is another subclass, "c", for soils that are limited chiefly by a climate that is too cold or too dry.

The next broader grouping, the land class, is identified by Roman numerals. All the soils in one class have limitations and management problems of about the same degree, but of different kinds, as shown by the subclass. All the land classes except class I may have one or more subclasses.

In classes I, II, and III are soils that are suitable for annual or periodic cultivation of annual or short-lived crops.

Class I soils are those that have the widest range of use and the least risk of damage. They are level, productive, well drained, and easy to work. They can be cultivated with almost no risk of erosion and will remain productive if managed with normal care.

Class II soils can be cultivated regularly, but they do not have quite so wide a range of suitability as class I soils. Some class II soils are gently sloping; consequently, they need moderate care to prevent erosion. Other soils in class II may be slightly droughty or slightly wet, or somewhat limited in depth.

Class III soils can be cropped regularly but have a narrower range of use than class II soils and need even more careful management.

In class IV are soils that should be cultivated only occasionally or only under very careful management.

In classes V, VI, and VII are soils that normally should not be cultivated for annual or short-lived crops, but they can be used for pasture or range, for woodland, or for wildlife.

Class V soils are nearly level and gently sloping but are droughty, wet, low in fertility, or otherwise unsuitable for cultivation.

Class VI soils are not suitable for crops because they are steep, severely eroded, shallow, or droughty or otherwise limited, but they give fair yields of forage or forest products. Some soils in class VI can, without damage, be cultivated enough so that fruit trees or forest trees can be set out or pasture and hay crops seeded.

Class VII soils provide only poor to fair yields of forage or forest products and have characteristics that limit them severely for these uses.

In class VIII are soils that have practically no agricultural use. Some of them have value as wildlife habitats, or for recreation. No class VIII soils occur in Forsyth County.

The capability classes, subclasses, and units in Forsyth County are given in the following outline. In several

of the subclasses, the capability units are not numbered consecutively because the system of symbols used applies to the soils of several counties.

Class I: Soils with few limitations that restrict their use.
- Unit I–1: Nearly level, well-drained soils in upland depressions.
- Unit I–2: Moderately well drained, level soil with only a slight erosion hazard.

Class II: Soils with some limitations that reduce the choice of plants or require moderate conservation practices.
- Subclass IIe: Soils that are moderately eroded or have a moderate hazard of erosion.
  - Unit IIe–1: Very gently sloping, red, loamy soils that are not more than slightly eroded.
  - Unit IIe–2: Very gently sloping, loamy, gray soils that have a slight hazard of erosion.
- Subclass IIw: Soils that are limited by excess water.
  - Unit IIw–2: Nearly level, well drained to moderately well drained, bottom-land soils that are susceptible to flooding.

Class III: Soils with severe limitations that reduce the choice of plants or require special conservation practices, or both.
- Subclass IIIe: Very gently sloping to gently sloping soils that are severely limited by erosion or the hazard of erosion.
  - Unit IIIe–1: Very gently sloping to gently sloping, red soils that are moderately eroded or are susceptible to erosion.
  - Unit IIIe–2: Very gently sloping to gently sloping, gray soils that are moderately eroded or are susceptible to erosion.
- Subclass IIIw: Nearly level soils that are severely limited by excess water.
  - Unit IIIw–2: Nearly level, moderately well drained to somewhat poorly drained, bottom-land soil.

Class IV: Soils that, because of very severe limitations, can be used only occasionally for crops. These soils are best suited to pasture or trees.
- Subclass IVe: Soils that are severely limited by erosion or the hazard of erosion.
  - Unit IVe–1: Very gently sloping to sloping soils that are slightly eroded to severely eroded.
  - Unit IVe–4: Gently sloping, eroded, shallow soils.
- Subclass IVw: Soils that are severely limited by excess water.
  - Unit IVw–1: Nearly level, poorly drained, bottom-land soils.
- Subclass IVs: Soils that are severely limited by insufficient moisture.
  - Unit IVs–1: Nearly level, droughty, sandy soil.

Class V: Soils that have little or no erosion hazard but have other limitations that restrict their use to pasture, range, woodland, or wildlife habitats.
- Subclass Vw: Soils that are very severely limited by excess water.
  - Unit Vw–1: Level or very gently sloping, poorly drained soils.

Class VI: Soils that generally are not suited to cultivation and are limited largely to use for range, woodland, and wildlife habitats.
- Subclass VIe: Soils very severely limited by erosion or the hazard of erosion.
  - Unit VIe–1: Sloping to steep soils that are moderately eroded or severely eroded or very susceptible to erosion.
  - Unit VIe–2: Very gently sloping to moderately steep soils that are moderately eroded or severely eroded or very susceptible to further erosion.
  - Unit VIe–3: Moderately steep, slightly eroded, shallow soils.

Class VII: Soils with very severe limitations that make them unsuited to cultivation and restrict their use largely to grazing, woodland, and wildlife habitats.
- Subclass VIIe: Soils that are too steep, too stony, or too erodible for cultivation.
  - Unit VIIe–1: Sloping to steep soils that are moderately eroded or severely eroded and gullied land types.
  - Unit VIIe–2: Shallow and stony soils.

### *Management by capability units*

In this subsection the soils of Forsyth County are placed in 18 capability units, or management groups. Described for each capability unit are the characteristics the soils have in common, the uses to which the soils are suited, and the management the soils require.

The suggestions for management of the various groups of soils may not suit exactly the needs of all the farmers in the county. Each farm has conditions peculiar to itself. Some of these may call for systems of management that differ from those discussed in this subsection.

#### CAPABILITY UNIT I–1

*Nearly level, well-drained soils in upland depressions*

Seneca fine sandy loam.
Starr loam.

These soils are deep, fertile, and loamy. They have a friable subsoil and are not susceptible to erosion. They respond well to good management.

*Suitability and management.*—These soils are well suited to cultivated crops. If row crops are grown year after year, fertilizer should be applied and winter and summer legumes grown so that fertility and organic matter are maintained. Suitable cropping systems are:

1. Corn interplanted with summer legumes.
2. Corn, and crimson clover or Austrian winter peas.
3. Corn, followed by small grain with lespedeza interplanted in the small grain in spring.

If these soils are properly limed and fertilized, they are well suited to hay and pasture. Fertilizer ought to be applied annually. The pasture plants and undesirable plants need mowing from time to time. Suitable plants for hay or pasture are coastal bermudagrass alone, or coastal bermudagrass overseeded with crimson clover; common bermuda mixed with white clover and lespedeza; tall fescue mixed with ladino clover; dallisgrass mixed with white clover and lespedeza; and annual lespedeza or sericea lespedeza.

#### CAPABILITY UNIT I–2

*Moderately well drained, level soil with only a slight erosion hazard*

Altavista fine sandy loam, level phase, is the only soil in this capability unit. This soil is deep and light colored. It has a clay loam subsoil, which slightly restricts the movement of water. There is very little runoff.

*Suitability and management.*—This soil is suited to all crops commonly grown in the area. It can be cultivated continuously if fertility and organic matter are maintained by adding commercial fertilizer and planting summer and winter legumes. Cultivation should be on the contour. Suggested cropping systems are:

1. Cotton, winter legume, cotton.
2. Corn interplanted with summer legumes, and then corn or cotton.
3. Corn, winter legume, corn or cotton.

This soil is well suited to hay and pasture, but it needs to be limed and fertilized before seeding. Additional fertilizer ought to be applied annually. Undesirable plants and excessive growth should be mowed. Suitable plants for hay or pasture are the same as those suggested for capability unit I–1.

#### CAPABILITY UNIT IIe–1

*Very gently sloping, red, loamy soils that are not more than slightly eroded*

Cecil sandy loam, very gently sloping phase.
Lloyd loam, very gently sloping phase.
Thurmont and Braddock fine sandy loams, very gently sloping phases.
Wickham fine sandy loam, very gently sloping phase.

These soils are deep, well drained, and moderately fertile. They have a moderate available moisture-holding capacity. They are strongly acid and are normally fairly well supplied with potassium.

*Suitability and management.*—These soils are suited to all crops commonly grown in the area. They can be used safely for row crops if half of the acreage is kept in close-growing crops each year and not more than two successive row crops are grown in the same place. To maintain high yields, these soils need to be limed and fertilized. Suggested cropping systems are:

1. First year, small grain and lespedeza; second year, volunteer lespedeza; third and fourth years, cotton or corn with a winter legume following the first year of the row crop.
2. A 2-year rotation of small grain and lespedeza followed by cotton or corn.

These soils are well suited to hay and pasture, but fertilizer ought to be applied annually and lime added when needed. Undesirable and excessive growth should be moved. Suggested plants for hay or pasture are coastal bermudagrass planted alone; coastal bermudagrass overseeded with crimson clover; alfalfa planted alone; bermudagrass mixed with white clover and lespedeza; tall fescue mixed with ladino clover; dallisgrass mixed with white clover and lespedeza; and sericea lespedeza.

A complete system of water disposal is needed. The terraces should drain from ridges to vegetated natural draws or to other outlets that are prepared before terracing. In establishing vegetation in the waterways, double the normal rates of seeding and fertilization (*3*).[1] All farming should be on the contour. Build the farm roads and fences on the crest of slopes, where the terraces divide, or on the contour. The fences can be next to natural drainways. Maintain vegetation by adding fertilizer and lime when they are needed.

#### CAPABILITY UNIT IIe–2

*Very gently sloping, loamy, gray soils that have a slight hazard of erosion*

Altavista fine sandy loam, very gently sloping phase.
Appling sandy loam, very gently sloping phase.
Masada fine sandy loam, very gently sloping phase.

These soils have a friable surface soil and a silty clay loam to loam subsoil that has moderately slow permeability. They are deep and moderately well drained and have a moderate available moisture-holding capacity. They contain a small amount of organic matter and have low to moderate natural fertility. Their reaction is strongly acid.

*Suitability and management.*—These soils are suited to most crops commonly grown in the county. Fertility and the content of organic matter ought to be kept high by adding fertilizer and lime liberally and growing summer and winter legumes. Close-growing crops ought to be planted every other year. A suitable cropping system is cotton or corn followed by small grain and lespedeza.

These soils are suited to hay and pasture if lime and a fertilizer that is high in potash are added. Excessive and undesirable plant growth ought to be mowed. Suitable plants are coastal bermudagrass mixed with lespedeza or white clover, or coastal bermudagrass overseeded with crimson clover; tall fescue mixed with ladino clover; dallisgrass mixed with white clover and lespedeza; sericea lespedeza, or sericea lespedeza mixed with tall fescue; and lespedeza grown alone.

These soils need a complete system of water disposal. In establishing this system, follow the suggestions given for capability unit IIe–1.

#### CAPABILITY UNIT IIw–2

*Nearly level, well drained to moderately well drained, bottom-land soils that are susceptible to flooding*

Alluvial land, moderately well drained.
Congaree fine sandy loam.
Congaree silt loam.

These mapping units are deep, strongly acid, and moderate or low in fertility. They have a very friable fine sandy loam or silt loam surface soil that is easy to work. Their subsoil is friable and rapidly permeable. They are moderate to moderately low in available moisture-holding capacity.

*Suitability and management.*—These mapping units are suited to cultivated crops, particularly corn and small grain. Suggested cropping systems are:

1. First year, small grain and lespedeza; second year, volunteer lespedeza; third and fourth years, corn followed by winter legume, corn.

[1] Numbers in italics refer to Literature Cited, p. 47.

2. Corn, small grain and lespedeza.

These soils are well suited to hay and pasture if enough lime and fertilizer are applied before seeding. They need additional fertilizer annually. Undesirable plant growth should be mowed. Suitable plants are coastal bermudagrass mixed with lespedeza or white clover, or coastal bermudagrass overseeded with crimson clover; tall fescue mixed with ladino clover; dallisgrass mixed with white clover and lespedeza; or annual lespedeza.

Where practical, these mapping units should be protected from overflow. Water accumulated on the surface can be drained by shallow, open ditches. Runoff from adjacent upland soils can be diverted by diversion ditches or by other methods.

#### CAPABILITY UNIT IIIe–1

*Very gently sloping to gently sloping, red soils that are moderately eroded or are susceptible to erosion*

Cecil sandy loam, gently sloping phase.
Cecil sandy loam, eroded very gently sloping phase.
Cecil fine sandy loam, eroded very gently sloping phase.
Hiwassee fine sandy loam, eroded gently sloping phase.
Lloyd loam, eroded very gently sloping phase.
Lloyd loam, eroded gently sloping phase.
Madison fine sandy loam, eroded very gently sloping phase.
Madison fine sandy loam, eroded gently sloping phase.
Masada fine sandy loam, eroded gently sloping phase.
Thurmont and Braddock fine sandy loams, eroded very gently sloping phases.
Wickham fine sandy loam, eroded very gently sloping phase.

These soils are deep, strongly acid, and, except for the Masada soil, well drained. The Masada soil is moderately well drained. All the soils are low in organic matter but contain a moderate amount of potassium. Their available moisture-holding capacity is moderate. They have a very friable, loamy surface soil and a moderately permeable, clay to sandy clay loam subsoil.

*Suitability and management.*—These soils are well suited to all crops commonly grown in the county. They can be cultivated safely if row crops are grown only once every 3 years. On some of the less severely eroded soils, row crops can be grown twice every 3 years. These soils need lime and fertilizer. Suitable cropping systems are:

1. First year, small grain and lespedeza; second year, volunteer lespedeza; third year, cotton or corn.
2. First year, small grain followed by grass and lespedeza; second year, volunteer lespedeza and grass; third year, cotton or corn.

These soils are suited to hay and pasture if enough lime and fertilizer are applied before seeding. Additional fertilizer should be applied annually, and undesirable plant growth should be mowed. Suitable seed mixtures are coastal bermudagrass planted alone, or coastal bermudagrass overseeded with crimson clover; alfalfa planted alone; bermudagrass mixed with white clover and lespedeza; tall fescue mixed with ladino clover; dallisgrass mixed with white clover and lespedeza; or sericea lespedeza grown alone or mixed with tall fescue.

A complete system of water disposal is needed. In establishing this system, follow the suggestions given for capability unit IIe–1.

#### CAPABILITY UNIT IIIe–2

*Very gently sloping to gently sloping, gray soils that are moderately eroded or are susceptible to erosion*

Altavista fine sandy loam, eroded very gently sloping phase.
Appling sandy loam, gently sloping phase.
Appling sandy clay loam, eroded very gently sloping phase.

These soils are deep, moderately well drained, and low in natural fertility. Their available moisture-holding capacity is moderate. They are strongly acid; the Altavista soil is especially deficient in lime. The surface soil of these soils is very friable to friable and loamy. The subsoil is sandy clay loam that has moderately slow permeability.

*Suitability and management.*—These soils are suited to most crops grown in the county if fertilizer is liberally applied and summer and winter legumes are grown. Close-growing crops should be grown 2 out of 3 years. Suggested cropping systems are:

1. First year, small grain and lespedeza; second year, volunteer lespedeza; third year, cotton or corn.
2. First year, small grain followed by grass and lespedeza; second year, volunteer lespedeza and grass; third year, small grain.

These soils are well suited to hay and pasture but need lime and a fertilizer high in potash. Additional fertilizer should be applied annually, and undesirable plants need to be mowed. Suitable plants are coastal bermudagrass planted alone; bermudagrass mixed with white clover and lespedeza; tall fescue mixed with ladino clover; or sericea lespedeza grown alone or mixed with tall fescue.

These soils need a complete system of water disposal. In establishing this system, follow the suggestions given for capability unit IIe–1. Wildlife areas on these soils need to be limed and fertilized.

#### CAPABILITY UNIT IIIw–2

*Nearly level, moderately well drained to somewhat poorly drained, bottom-land soil*

Chewacla silt loam is the only soil in this capability unit. This soil has a very friable silt loam surface soil. Its subsoil is normally silt loam but, in places, contains lenses of sandy material. This soil is deep and is not susceptible to erosion. Its available moisture-holding capacity is moderate. It is strongly acid.

*Suitability and management.*—If drained, this soil is excellent for all crops grown in the county. Generally, it can be drained easily. Applications of lime improve all crops. A suitable 3-year rotation provides small grain overseeded with annual lespedeza the first year, lespedeza the second year, and corn the third year.

This soil is well suited to hay and pasture. To obtain high yields of hay and good pasture, undesirable plant growth should be mowed, fertilizer applied annually, and grazing controlled. Suitable plant mixtures are bermudagrass mixed with crimson clover and oats mixed with tall fescue and white clover.

If this soil is used for cultivated crops, deep ditches are needed to remove surface water and to lower the water table. If it is used for pasture, shallow ditches are needed. Where practical, the soil should be protected

from overflow. Diversion ditches or other structures are needed to divert runoff that comes from adjacent upland soils.

#### CAPABILITY UNIT IVe-1

*Very gently sloping to sloping soils that are slightly eroded to severely eroded*

Appling sandy loam, sloping phase.
Appling sandy clay loam, eroded gently sloping phase.
Appling sandy clay loam, eroded sloping phase.
Cecil sandy loam, eroded gently sloping phase.
Cecil sandy loam, sloping phase.
Cecil sandy loam, eroded sloping phase.
Cecil clay loam, severely eroded very gently sloping phase.
Cecil fine sandy loam, gently sloping phase.
Cecil fine sandy loam, eroded gently sloping phase.
Cecil fine sandy loam, sloping phase.
Hiwassee fine sandy clay loam, eroded sloping phase.
Lloyd loam, eroded sloping phase.
Lloyd clay loam, severely eroded very gently sloping phase.
Lloyd clay loam, severely eroded gently sloping phase.
Madison fine sandy loam, eroded sloping phase.
Madison fine sandy clay loam, severely eroded very gently sloping phase.

These soils are deep and, except for the Appling soils, well drained. The Appling soils are moderately well drained. All the soils have a loamy surface soil and a clay loam or sandy clay loam subsoil that has moderately slow to moderate permeability. They respond well to good management. They are strongly acid.

*Suitability and management.*—Although they are better suited to hay and pasture, these soils can be used occasionally for cultivated crops if they are carefully managed. Slopes longer than 100 feet ought to be stripcropped (fig. 2). If these soils are needed for row crops, do not cultivate more than one-fifth the acreage in 1 year. Vegetated waterways and natural draws should be kept in sod at all times.

These soils are best suited to hay and pasture (fig. 3). To obtain good yields of grasses and legumes, adequate amounts of lime and fertilizer or manure should be applied before seeding, and additional fertilizer is needed annually for maintenance. Undesirable growth ought to be mowed. Perennial plants can be grown alone or mixed with reseeding legumes or grasses. Suitable perennial plants are coastal bermudagrass, sericea lespedeza, tall fescue, and kudzu.

***Figure 2.*—Stripcropping on Lloyd loam, eroded sloping phase, an accepted practice for class IV land.**

***Figure 3.*—Cecil fine sandy loam, sloping phase, in the foreground, and Cecil fine sandy loam, moderately steep phase, in background, are used for improved pasture.**

If these soils are cultivated, slopes should be terraced where practicable. All farming operations should be on the contour. If the runoff from adjacent upland soils is enough to cause erosion, it should be diverted to channels constructed just above the cultivated areas. The vegetated waterways should receive twice the amounts of seed and fertilizer that are normally applied for pasture (*3*).

#### CAPABILITY UNIT IVe-4

*Gently sloping, eroded, shallow soils*

Louisa fine sandy loam, eroded sloping phase.
Louisa fine sandy loam, eroded gently sloping phase.
Louisburg sandy loam, eroded gently sloping phase.

These soils have somewhat excessive surface drainage, rapid internal drainage, and low to moderately low available moisture-holding capacity. They contain a small amount of organic matter and are strongly acid. The workability, which is poor to good, depends on the quantity of gravel and stones in the surface soil and the number of rock outcrops.

*Suitability and management.*—These soils can be used for row crops, but not more than one-fifth of the acreage should be cultivated at one time. Slopes longer than 100 feet ought to be stripcropped. Vegetated waterways and natural draws should be kept in sod. Before grasses and legumes are seeded, lime and fertilizer ought to be applied liberally. Suitable perennial plants are sericea lespedeza, tall fescue, and kudzu.

This soil is better suited to hay or pasture than it is to row crops. Sericea lespedeza, tall fescue, and kudzu can be used in grass-and-legume mixtures. Kudzu and sericea lespedeza can also be grown alone. Apply adequate lime and fertilizer before seeding, and apply additional fertilizer or manure annually. Undesirable plants should be mowed.

Use the same methods for getting rid of excess water that are suggested for capability unit IVe-1.

#### CAPABILITY UNIT IVw-1

*Nearly level, poorly drained, bottom-land soils*

Alluvial land, poorly drained.
Wehadkee silt loam.

These soils are likely to be flooded frequently and may remain under water for long periods. They are moderately deep and have a very friable, sandy loam to silt loam surface soil. The surface soil is underlain by sandy loam to silty clay loam that has moderately slow to slow permeability and is mottled.

*Suitability and management.*—Although these soils are not suited to cultivated crops, they can be used for hay or pasture. They need lime and fertilizer before seeding and additional fertilizer annually. Undesirable plant growth should be mowed. A suitable plant mixture is tall fescue and ladino clover or dallisgrass and white clover.

Where practical, these mapping units should be protected from overflow. Seepage and runoff from adjacent upland soils can be diverted by diversion ditches or by using other methods. Excess surface water can be drained by open ditches.

#### CAPABILITY UNIT IVs-1

*Nearly level, droughty, sandy soil*

Buncombe loamy fine sand is the only soil in this capability unit. This is a deep, bottom-land soil that is likely to be flooded frequently. When it is not flooded, it is somewhat excessively drained. It has slow runoff and rapid internal drainage. This soil is low in fertility and low in available moisture-holding capacity. It is strongly acid.

*Suitability and management.*—Most of the crops grown in the county can be used on this soil if two-thirds of the acreage is kept in close-growing crops. Additions of fertilizer are needed, and summer and winter legumes should be grown. Sericea lespedeza can be seeded in a row crop early in July; it ought to be kept on the soil 2 or 3 years before another row crop is planted.

This soil is suited to hay and pasture but needs to be well limed and fertilized before seeding. Undesirable plants should be mowed and additional fertilizer applied annually. Suitable plants are coastal bermudagrass mixed with sericea lespedeza or sericea lespedeza planted alone. This is a very good soil for growing coastal bermudagrass stolons when properly fertilized.

#### CAPABILITY UNIT Vw-1

*Level or very gently sloping, poorly drained soils*

Worsham sandy loam, level phase.
Worsham sandy loam, very gently sloping phase.

These soils have very slow permeability, slow runoff, and slow internal drainage. Their available moisture-holding capacity is moderate. They are strongly acid. These soils are deep, but, on sloping areas, they are susceptible to erosion. They are sometimes called "gumbo." They respond poorly to management.

*Suitability and management.*—These soils are not suited to cultivated crops, although some of their acreage is cultivated. They can be used successfully for hay or pasture if lime is applied when needed and a fertilizer high in potash is applied annually. Grazing must be controlled, and undesirable plants should be mowed. Suitable plants for hay or pasture are tall fescue mixed with whiteclover; or dallisgrass or bermudagrass mixed with whiteclover and lespedeza.

#### CAPABILITY UNIT VIe-1

*Sloping to steep soils that are moderately eroded or severely eroded or very susceptible to erosion*

Cecil fine sandy loam, steep phase.
Thurmont and Braddock fine sandy loams, severely eroded sloping phases.

These soils are deep, well drained, and very susceptible to erosion. They are low in organic matter and strongly acid. Their available moisture-holding capacity is moderate to moderately low. These soils have a very friable fine sandy loam surface soil and a moderately permeable clay loam or sandy clay loam subsoil.

*Suitability and management.*—Although much of the acreage is cultivated, these soils are not suited to cultivated crops. Cleared areas can be used for hay or pasture but need liberal applications of lime and fertilizer before seeding, good seedbed preparation, and proper seeding. Additional fertilizer should be applied annually. Undesirable plants should be mowed and grazing controlled. Areas that are extremely susceptible to erosion ought to have excess water diverted and the soil mulched. Suitable pasture plants are coastal bermudagrass mixed with lespedeza; tall fescue mixed with ladino clover; sericea lespedeza grown alone or mixed with tall fescue; or kudzu.

#### CAPABILITY UNIT VIe-2

*Very gently sloping to moderately steep soils that are moderately eroded or severely eroded or very susceptible to further erosion*

Appling sandy loam, moderately steep phase.
Appling sandy clay loam, severely eroded gently sloping phase.
Appling sandy clay loam, severely eroded sloping phase.
Cecil fine sandy loam, moderately steep phase.
Cecil fine sandy loam, eroded sloping phase.
Cecil clay loam, severely eroded gently sloping phase.
Lloyd loam, moderately steep phase.
Lloyd loam, eroded moderately steep phase.
Lloyd clay loam, severely eroded sloping phase.
Madison fine sandy loam, eroded moderately steep phase.
Madison fine sandy loam, moderately steep phase.
Madison fine sandy clay loam, severely eroded sloping phase.
Madison fine sandy clay loam, severely eroded gently sloping phase.
Wickham fine sandy loam, eroded sloping phase.
Worsham sandy loam, eroded very gently sloping phase.

These soils are deep and moderately well drained to well drained, except for Worsham soil, which is poorly drained. Their available moisture-holding capacity is moderate. They are low in organic matter and are strongly acid. They have a loamy surface soil and a friable sandy loam, sandy clay loam, clay loam, or clay subsoil. All of the soils are susceptible to erosion.

*Suitability and management.*—Although a large part of the acreage has been cultivated, these soils are not suited to cultivated crops. They are well suited to pine

trees. Cleared areas should be used for hay or pasture but need liberal applications of lime and fertilizer before seeding, good seedbed preparation, and proper seeding. Additional fertilizer should be applied annually. Undesirable plants should be mowed and grazing controlled. In some areas, excess water should be diverted and the soils mulched. Suitable pasture plants are the same as those suggested for capability unit VIe–1, except that kudzu and sericea lespedeza are not suited to Worsham soils.

#### CAPABILITY UNIT VIe–3

*Moderately steep, slightly eroded, shallow soils*

Louisa fine sandy loam, moderately steep phase.
Louisburg sandy loam, moderately steep phase.

These soils are well drained to excessively drained and have moderately low to low available moisture-holding capacity. They are low in organic matter and in fertility. They are strongly acid. These soils have a friable to very friable sandy loam surface soil that is easy to work. They have a friable subsoil that is moderate to rapid in permeability. Their response to management is poor to fair.

*Suitability and management.*—These soils are not suited to cultivated crops. They are best suited to pine trees. They are fairly well suited to hay and pasture but need liberal amounts of lime and fertilizer before seeding. To maintain good pasture, undesirable plants should be mowed and additional fertilizer applied annually. Suitable perennial pasture plants are sericea lespedeza, tall fescue, kudzu, and coastal bermudagrass.

#### CAPABILITY UNIT VIIe–1

*Sloping to steep soils that are moderately eroded or severely eroded and gullied land types*

Appling sandy clay loam, severely eroded moderately steep phase.
Cecil clay loam, severely eroded sloping phase.
Cecil clay loam, severely eroded moderately steep phase.
Cecil clay loam, severely eroded steep phase.
Cecil fine sandy loam, eroded moderately steep phase.
Gullied land, acid materials.
Gullied land, Lloyd materials.
Lloyd clay loam, severely eroded moderately steep phase.
Madison fine sandy clay loam, severely eroded moderately steep phase.
Severely gullied land.
Worsham sandy loam, severely eroded sloping phase.

Although these soils are deep to moderately deep, they are very susceptible to erosion. They are moderate to moderately low in available moisture-holding capacity. They contain a small amount of organic matter and are strongly acid.

*Suitability and management.*—These soils are best suited to pine trees. They are not suited to cultivated crops and are severely limited in their suitability for pasture. Some of the acreage, however, is cultivated.

#### CAPABILITY UNIT VIIe–2

*Shallow and stony soils*

Edgemont stony sandy loam, moderately steep phase.
Edgemont stony sandy loam, eroded very gently sloping phase.
Edgemont stony sandy loam, gently sloping phase.
Edgemont stony sandy loam, eroded sloping phase.
Edgemont stony sandy loam, eroded moderately steep phase.
Edgemont stony sandy loam, steep phase.
Habersham stony fine sandy loam, moderately steep phase.
Habersham stony fine sandy loam, eroded very gently sloping phase.
Habersham stony fine sandy loam, sloping phase.
Habersham stony fine sandy loam, severely eroded sloping phase.
Habersham stony fine sandy loam, severely eroded moderately steep phase.
Louisa fine sandy loam, steep phase.
Louisa fine sandy clay loam, severely eroded moderately steep phase.
Louisburg sandy loam, steep phase.

These soils are well drained to excessively drained and are rapid to moderately rapid in permeability. Their available moisture-holding capacity is moderately low to low. They are strongly acid and are low in fertility and in organic matter. They have a friable, loamy surface soil. Their subsoil, except for that of the Louisburg soil, is sandy clay loam or silty clay loam. The Louisburg soil has weathered rock at a depth of about 10 inches. All of these soils are very susceptible to erosion.

*Suitability and management.*—These soils are best suited to pine trees. They are not suited to cultivated crops and are severely limited in their suitability for pasture. Some of the acreage, however, is cultivated.

## Estimated Yields

Table 1 gives, for each soil, estimated average acre yields, under two levels of management, and the site indexes, under normal conditions, for three species of pine. Only one site index for each species of pine is given for each soil. The site indexes are based on actual measurement and on estimated growth.

For crops and pasture, the yields in columns A are those to be expected under management generally used in the county; yields in columns B are those expected under the best management used.

Since the crop yields given in table 1 are averages expected over several years, yields higher than those given in columns B can be expected from time to time. Higher yields can be obtained in favorable years, especially if more fertilizer is applied than is now thought feasible to apply. Yields may increase in the future as new crop varieties are introduced; or they may decrease as new plant diseases and insects appear.

Part of the management practiced in the county is fertilization. For cotton, the farmers who generally obtain the yields in column A will apply, before planting, 300 to 400 pounds of 4–12–12 [2] and 16 to 20 pounds of nitrogen per acre. For corn, they apply 200 to 300 pounds of 4–12–12 and topdress with chicken litter and 32 pounds of nitrogen. For grain sorghum the rate of fertilization is the same as that for corn. The grain sorghum is sometimes planted after oats are grown. The fertilization per acre commonly used for wheat and oats is 200 to 300 pounds of 5–10–10 and as much as 32 pounds of nitrogen.

[2] Percentages, respectively, of nitrogen, phosphate, and potash.

TABLE 1.—*Estimated average acre yields of principal crops and carrying capacity of pasture under two levels of management, and site indexes for species of pine*

[In columns A are yields of crops and carrying capacity of pasture to be expected under management commonly practiced in the county; in columns B are those expected under the best management now practiced. Dashed lines indicate that crop is not commonly grown on the soil and is considered unsuited to it]

| Soil | Slope range | Cotton | | Corn | | Grain sorghum | | Wheat | | Oats | | Coastal bermudagrass | | | | Permanent pasture | | Alfalfa | | Lespedeza | | Pine trees (site index [1]) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Pasture | | Hay | | | | | | | | Loblolly | Shortleaf | Virginia |
| | | A | B | A | B | A | B | A | B | A | B | A | B | A | B | A | B | A | B | A | B | | | |
| | *Percent* | *Lb.* | *Lb.* | *Bu.* | *Bu.* | *Bu.* | *Bu.* | *Bu.* | *Bu.* | *Bu.* | *Bu.* | *Cow-acre-days* [2] | *Cow-acre-days* [2] | *Tons* | *Tons* | *Cow-acre-days* [2] | *Cow-acre-days* [2] | *Tons* | *Tons* | *Tons* | *Tons* | *Feet* | *Feet* | *Feet* |
| Alluvial land, moderately well drained | 0–2 | ---- | ---- | 30 | 75 | 40 | 60 | ---- | ---- | 35 | 90 | 150 | 250 | 3.0 | 6.0 | 75 | 210 | ---- | ---- | 1.5 | 1.8 | [3] 105 | ---- | ---- |
| Alluvial land, poorly drained | 0–2 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 60 | 120 | ---- | ---- | .5 | .7 | ---- | 80 | ---- |
| Altavista fine sandy loam, level phase | 0–2 | 250 | 400 | 30 | 80 | 25 | 60 | ---- | ---- | 35 | 70 | 130 | 210 | 2.5 | 5.0 | 65 | 190 | ---- | ---- | 1.3 | 1.6 | [3] 80 | [3] 60 | ---- |
| Altavista fine sandy loam, very gently sloping phase | 2–7 | 350 | 500 | 25 | 75 | 25 | 50 | ---- | ---- | 35 | 70 | 130 | 210 | 2.5 | 5.0 | 65 | 185 | ---- | ---- | 1.2 | 1.5 | 80 | 60 | ---- |
| Altavista fine sandy loam, eroded very gently sloping phase | 2–7 | 300 | 450 | 20 | 60 | 25 | 45 | ---- | ---- | 30 | 65 | 110 | 200 | 2.0 | 4.5 | 60 | 175 | ---- | ---- | 1.2 | 1.4 | 80 | 60 | ---- |
| Appling sandy loam, very gently sloping phase | 2–7 | 350 | 450 | 25 | 75 | 25 | 50 | 12 | 20 | 35 | 70 | 130 | 210 | 2.3 | 4.8 | 75 | 190 | (4) | 3.0 | 1.5 | 1.9 | [3] 90 | [3] 70 | ---- |
| Appling sandy loam, gently sloping phase | 7–10 | 300 | 400 | 20 | 60 | 25 | 45 | 10 | 18 | 35 | 70 | 130 | 210 | 2.3 | 4.8 | 75 | 190 | (4) | 3.0 | 1.5 | 1.8 | 90 | 70 | ---- |
| Appling sandy loam, sloping phase | 10–14 | ---- | ---- | 15 | 45 | 25 | 40 | 10 | 15 | 35 | 70 | 125 | 200 | 2.1 | 4.7 | 65 | 180 | ---- | ---- | 1.4 | 1.6 | 90 | 70 | ---- |
| Appling sandy loam, moderately steep phase | 14–25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 100 | 160 | 1.5 | 4.1 | 50 | 165 | ---- | ---- | .8 | 1.0 | 90 | 70 | ---- |
| Appling sandy clay loam, eroded very gently sloping phase | 2–7 | 300 | 400 | 15 | 40 | 25 | 35 | 10 | 20 | 30 | 65 | 110 | 200 | 2.0 | 4.5 | 60 | 175 | (4) | 2.5 | .8 | 1.0 | [3] 80 | [3] 60 | ---- |
| Appling sandy clay loam, eroded gently sloping phase | 7–10 | 200 | 300 | 12 | 35 | 25 | 35 | 10 | 20 | 30 | 65 | 110 | 200 | 2.0 | 4.5 | 60 | 175 | (4) | 2.5 | .8 | 1.0 | 80 | 60 | ---- |
| Appling sandy clay loam, severely eroded gently sloping phase | 7–10 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 100 | 190 | 1.7 | 4.0 | 50 | 165 | ---- | ---- | .5 | .7 | 75 | 55 | ---- |
| Appling sandy clay loam, eroded sloping phase | 10–14 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 100 | 190 | 1.7 | 4.0 | 50 | 165 | ---- | ---- | .5 | .7 | 80 | 60 | ---- |
| Appling sandy clay loam, severely eroded sloping phase | 10–14 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 90 | 175 | 1.5 | 4.0 | 40 | 150 | ---- | ---- | .5 | .7 | 75 | 55 | ---- |
| Appling sandy clay loam, severely eroded moderately steep phase | 14–25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 90 | 175 | 1.5 | 4.0 | 40 | 150 | ---- | ---- | .3 | .5 | 75 | 55 | ---- |
| Buncombe loamy fine sand | 0–2 | ---- | ---- | 12 | 50 | 20 | 45 | ---- | ---- | ---- | ---- | 100 | 180 | 1.7 | 4.1 | 25 | 50 | ---- | ---- | .7 | .9 | ---- | ---- | ---- |
| Cecil sandy loam, very gently sloping phase | 2–7 | 350 | 550 | 30 | 65 | 30 | 60 | 15 | 20 | 40 | 75 | 130 | 220 | 2.3 | 5.3 | 70 | 210 | (4) | 3.0 | 1.6 | 1.8 | [3] 80 | [3] 70 | [3] 70 |
| Cecil sandy loam, eroded very gently sloping phase | 2–7 | 325 | 500 | 25 | 60 | 30 | 55 | 12 | 18 | 40 | 75 | 130 | 220 | 2.3 | 5.3 | 70 | 200 | (4) | 2.5 | 1.4 | 1.6 | 80 | 70 | 70 |
| Cecil sandy loam, gently sloping phase | 7–10 | 325 | 450 | 25 | 60 | 25 | 50 | 15 | 20 | 40 | 75 | 125 | 220 | 2.2 | 5.3 | 65 | 195 | (4) | 2.0 | 1.2 | 1.5 | 80 | 70 | 70 |
| Cecil sandy loam, eroded gently sloping phase | 7–10 | 275 | 400 | 20 | 50 | 25 | 45 | 12 | 18 | 35 | 70 | 110 | 210 | 2.0 | 5.0 | 60 | 190 | (4) | 2.0 | 1.0 | 1.3 | 80 | 70 | 70 |

TABLE 1.—*Estimated average acre yields of principal crops and carrying capacity of pasture under two levels of management, and site indexes for species of pine*—Continued

| Soil | Slope range | Cotton | | Corn | | Grain sorghum | | Wheat | | Oats | | Coastal bermudagrass | | | | Permanent pasture | | Alfalfa | | Lespedeza | | Pine trees (site index [1]) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Pasture | | Hay | | | | | | | | Loblolly | Shortleaf | Virginia |
| | | A | B | A | B | A | B | A | B | A | B | A | B | A | B | A | B | A | B | A | B | | | |
| | *Percent* | *Lb.* | *Lb.* | *Bu.* | *Bu.* | *Bu.* | *Bu.* | *Bu.* | *Bu.* | *Bu.* | *Bu.* | *Cow-acre-days* [2] | *Cow-acre-days* [2] | *Tons* | *Tons* | *Cow-acre-days* [2] | *Cow-acre-days* [2] | *Tons* | *Tons* | *Tons* | *Tons* | *Feet* | *Feet* | *Feet* |
| Cecil sandy loam, sloping phase | 10–15 | 250 | 375 | 25 | 50 | 30 | 50 | 12 | 20 | 35 | 65 | 125 | 220 | 2.2 | 5.3 | 65 | 195 | (4) | 1.6 | 1.2 | 1.4 | 80 | 70 | 70 |
| Cecil sandy loam, eroded sloping phase | 10–15 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 90 | 185 | 1.3 | 4.5 | 45 | 170 | ---- | ---- | .7 | .9 | 80 | 70 | 70 |
| Cecil clay loam, severely eroded very gently sloping phase | 2–7 | 200 | 300 | 10 | 45 | 25 | 45 | 8 | 15 | 20 | 40 | 100 | 200 | 1.7 | 4.7 | 55 | 175 | (4) | 2.5 | .8 | 1.0 | [3] 80 | [3] 70 | [3] 70 |
| Cecil clay loam, severely eroded gently sloping phase | 7–10 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 90 | 190 | 1.3 | 4.3 | 45 | 170 | ---- | ---- | .6 | .8 | 80 | 70 | 70 |
| Cecil clay loam, severely eroded sloping phase | 7–14 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 90 | 190 | 1.3 | 4.3 | 45 | 170 | ---- | ---- | .6 | .8 | 80 | 70 | 70 |
| Cecil clay loam, severely eroded moderately steep phase | 14–25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 85 | 175 | 1.2 | 4.2 | 35 | 160 | ---- | ---- | .5 | .7 | 80 | 70 | 70 |
| Cecil clay loam, severely eroded steep phase | 25+ | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 85 | 175 | 1.2 | 4.2 | 30 | 90 | ---- | ---- | .4 | .6 | 80 | 70 | 70 |
| Cecil fine sandy loam, eroded very gently sloping phase | 3–10 | 300 | 450 | 20 | 50 | 28 | 50 | 10 | 20 | 35 | 70 | 130 | 220 | 2.4 | 5.0 | 75 | 195 | (4) | 2.5 | 1.2 | 1.5 | 80 | 70 | 70 |
| Cecil fine sandy loam, gently sloping phase | 10–15 | 250 | 350 | 20 | 45 | 25 | 50 | 10 | 20 | 35 | 70 | 125 | 210 | 2.2 | 5.0 | 65 | 190 | (4) | 3.0 | 1.6 | 1.9 | 80 | 70 | 70 |
| Cecil fine sandy loam, eroded gently sloping phase | 10–15 | 225 | 350 | 20 | 35 | 25 | 45 | 10 | 20 | 35 | 70 | 90 | 185 | 1.5 | 4.5 | 50 | 175 | (4) | 2.5 | 1.4 | 1.6 | 80 | 70 | 70 |
| Cecil fine sandy loam, sloping phase | 15–20 | 200 | 300 | 20 | 35 | 25 | 45 | 10 | 20 | 35 | 70 | 100 | 210 | 1.7 | 5.0 | 55 | 185 | (4) | 2.5 | 1.2 | 1.5 | 80 | 70 | 70 |
| Cecil fine sandy loam, eroded sloping phase | 15–20 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 90 | 185 | 1.5 | 4.5 | 45 | 165 | ---- | ---- | 1.0 | 1.3 | 80 | 70 | 70 |
| Cecil fine sandy loam, moderately steep phase | 20–30 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 80 | 175 | 1.3 | 4.2 | 40 | 160 | ---- | ---- | .7 | .8 | 80 | 70 | 70 |
| Cecil fine sandy loam, eroded moderately steep phase | 20–30 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 70 | 160 | 1.2 | 4.0 | 35 | 155 | ---- | ---- | .5 | .7 | 80 | 70 | 70 |
| Cecil fine sandy loam, steep phase | 30+ | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 70 | 160 | 1.2 | 4.0 | 35 | 155 | ---- | ---- | .5 | .7 | 80 | 70 | 70 |
| Chewacla silt loam | 0–2 | ---- | ---- | 35 | 75 | 40 | 60 | ---- | ---- | ---- | ---- | 135 | 240 | 2.5 | 6.0 | 75 | 225 | ---- | ---- | 1.5 | 1.8 | ---- | 80 | ---- |
| Congaree silt loam | 0–2 | ---- | ---- | 35 | 100 | 40 | 60 | ---- | ---- | 35 | 75 | 150 | 260 | 2.7 | 6.3 | 85 | 260 | ---- | ---- | 1.7 | 2.0 | 105 | ---- | ---- |
| Congaree fine sandy loam | 0–2 | ---- | ---- | 35 | 90 | 40 | 60 | ---- | ---- | 40 | 80 | 160 | 290 | 3.0 | 6.7 | 90 | 250 | ---- | ---- | 1.7 | 2.0 | [3] 105 | 80 | ---- |
| Edgemont stony sandy loam, moderately steep phase | 10–15 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 80 | 70 | 80 |
| Edgemont stony sandy loam, eroded very gently sloping phase | 2–6 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 40 | 90 | ---- | ---- | 1.4 | 1.6 | [3 5] 80 | [3] 70 | [3] 80 |
| Edgemont stony sandy loam, gently sloping phase | 6–10 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 40 | 90 | ---- | ---- | 1.4 | 1.6 | 80 | 70 | 80 |
| Edgemont stony sandy loam, eroded sloping phase | 2–10 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 35 | 80 | ---- | ---- | 1.1 | 1.3 | 80 | 70 | 80 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Edgemont stony sandy loam, eroded moderately steep phase | 10–15 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 80 | 70 | 80 |
| Edgemont stony sandy loam, steep phase | 15+ | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 80 | 70 | 80 |
| Gullied land, acid materials | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Gullied land, Lloyd materials | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Habersham stony fine sandy loam, moderately steep phase | 15+ | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 80 | 70 | 80 |
| Habersham stony fine sandy loam, eroded very gently sloping phase | 2–6 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 40 | 90 | ---- | ---- | 1.0 | 1.3 | [3 5] 80 | [3] 70 | [3] 80 |
| Habersham stony fine sandy loam, sloping phase | 6–10 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 30 | 70 | ---- | ---- | .7 | .9 | 80 | 70 | 70 |
| Habersham stony fine sandy loam, severely eroded sloping phase | 6–15 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 25 | 60 | ---- | ---- | ---- | ---- | 80 | 70 | 80 |
| Habersham stony fine sandy loam, severely eroded moderately steep phase | 15+ | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 80 | 70 | 80 |
| Hiwassee fine sandy loam, eroded gently sloping phase | 2–6 | 300 | 500 | 30 | 75 | 35 | 60 | 15 | 20 | 35 | 70 | 150 | 260 | 2.7 | 6.3 | 80 | 225 | (4) | 3.5 | 1.5 | 1.8 | [3] 90 | [3] 70 | [3] 80 |
| Hiwassee fine sandy clay loam, eroded sloping phase | 6–15 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 110 | 220 | 2.0 | 5.5 | 60 | 200 | ---- | ---- | 1.2 | 1.5 | [3] 70 | [3] 60 | [3] 80 |
| Lloyd loam, very gently sloping phase | 2–6 | 400 | 550 | 25 | 60 | 35 | 60 | 18 | 25 | 40 | 80 | 140 | 240 | 2.5 | 6.2 | 75 | 230 | (4) | 4.0 | 1.5 | 2.0 | [3] 80 | [3] 70 | ---- |
| Lloyd loam, eroded very gently sloping phase | 2–6 | 375 | 525 | 25 | 55 | 30 | 55 | 15 | 23 | 40 | 80 | 130 | 220 | 2.3 | 6.0 | 70 | 220 | (4) | 3.5 | 1.2 | 1.6 | 80 | 70 | ---- |
| Lloyd loam, eroded gently sloping phase | 6–10 | 300 | 450 | 25 | 55 | 30 | 55 | 15 | 23 | 35 | 70 | 130 | 210 | 2.3 | 5.8 | 70 | 210 | (4) | 3.0 | 1.0 | 1.4 | 80 | 70 | ---- |
| Lloyd loam, eroded sloping phase | 10–14 | 275 | 350 | 20 | 50 | 25 | 50 | 15 | 20 | 20 | 40 | 125 | 220 | 2.2 | 5.5 | 65 | 200 | ---- | ---- | 1.0 | 1.2 | 80 | 70 | ---- |
| Lloyd loam, moderately steep phase | 14–25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 75 | 150 | 1.3 | 4.0 | 40 | 150 | ---- | ---- | .7 | .9 | 80 | 70 | ---- |
| Lloyd loam, eroded moderately steep phase | 14–25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 50 | 140 | 1.0 | 3.3 | 30 | 135 | ---- | ---- | .5 | .7 | 80 | 70 | ---- |
| Lloyd clay loam, severely eroded very gently sloping phase | 2–7 | 250 | 400 | 15 | 40 | 25 | 45 | 8 | 15 | 20 | 45 | 90 | 190 | 1.7 | 5.0 | 50 | 190 | (4) | 3.0 | 1.2 | 1.7 | [3] 80 | [3] 60 | [3] 90 |
| Lloyd clay loam, severely eroded gently sloping phase | 7–10 | 225 | 375 | 12 | 35 | 25 | 40 | 8 | 15 | 20 | 40 | 75 | 180 | 1.3 | 4.5 | 45 | 175 | ---- | ---- | 1.0 | 1.2 | 80 | 60 | 90 |
| Lloyd clay loam, severely eroded sloping phase | 10–14 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 60 | 160 | 1.2 | 4.0 | 35 | 160 | ---- | ---- | .7 | .8 | 80 | 60 | 90 |
| Lloyd clay loam, severely eroded moderately steep phase | 14–25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 50 | 140 | 1.0 | 3.3 | 30 | 120 | ---- | ---- | .5 | .7 | 80 | 60 | 90 |
| Louisa fine sandy loam, eroded gently sloping phase | 2–10 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 75 | 150 | 1.3 | 4.0 | 40 | 160 | ---- | ---- | .6 | .8 | [3] 80 | [3] 70 | ---- |
| Louisa fine sandy loam, eroded sloping phase | 10–14 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 60 | 140 | 1.2 | 3.7 | 35 | 150 | ---- | ---- | .5 | .7 | 80 | 70 | ---- |
| Louisa fine sandy loam, moderately steep phase | 14–25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 40 | 140 | .8 | 3.3 | 35 | 100 | ---- | ---- | .4 | .6 | 80 | 70 | ---- |
| Louisa fine sandy loam, steep phase | 25+ | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 80 | 70 | ---- |
| Louisa fine sandy clay loam, severely eroded moderately steep phase | 14–25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | [3] 60 | [3] 50 | ---- |

TABLE 1.—*Estimated average acre yields of principal crops and carrying capacity of pasture under two levels of management, and site indexes for species of pine*—Continued

| Soil | Slope range | Cotton | | Corn | | Grain sorghum | | Wheat | | Oats | | Coastal bermudagrass | | | | Permanent pasture | | Alfalfa | | Lespedeza | | Pine trees (site index [1]) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Pasture | | Hay | | | | | | | | Loblolly | Shortleaf | Virginia |
| | | A | B | A | B | A | B | A | B | A | B | A | B | A | B | A | B | A | B | A | B | | | |
| | *Percent* | *Lb.* | *Lb.* | *Bu.* | *Bu.* | *Bu.* | *Bu.* | *Bu.* | *Bu.* | *Bu.* | *Bu.* | *Cow-acre-days* [2] | *Cow-acre-days* [2] | *Tons* | *Tons* | *Cow-acre-days* [2] | *Cow-acre-days* [2] | *Tons* | *Tons* | *Tons* | *Tons* | *Feet* | *Feet* | *Feet* |
| Louisburg sandy loam, eroded gently sloping phase | 2–14 | 150 | 250 | 10 | 35 | 20 | 30 | ---- | ---- | 15 | 35 | 90 | 190 | 1.7 | 5.0 | 50 | 150 | ---- | ---- | .7 | .9 | [3] 70 | [3] 60 | ---- |
| Louisburg sandy loam, moderately steep phase | 14–25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 75 | 140 | 1.3 | 3.7 | 40 | 90 | ---- | ---- | .5 | .7 | 70 | 60 | ---- |
| Louisburg sandy loam, steep phase | 25+ | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 30 | 75 | ---- | ---- | .3 | .5 | 70 | 60 | ---- |
| Madison fine sandy loam, eroded very gently sloping phase | 2–7 | 350 | 500 | 25 | 60 | 25 | 45 | 10 | 20 | 40 | 75 | 135 | 210 | 2.3 | 5.3 | 70 | 200 | (4) | 2.5 | 1.4 | 1.7 | [3] 80 | [3] 70 | [3] 70 |
| Madison fine sandy loam, eroded gently sloping phase | 7–10 | 325 | 450 | 20 | 50 | 25 | 45 | 10 | 20 | 40 | 75 | 110 | 210 | 2.0 | 5.0 | 60 | 190 | (4) | 2.0 | 1.1 | 1.4 | 80 | 70 | 70 |
| Madison fine sandy loam, eroded sloping phase | 10–14 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 75 | 190 | 2.3 | 4.5 | 40 | 175 | ---- | ---- | .7 | .9 | 80 | 70 | 70 |
| Madison fine sandy loam, moderately steep phase | 14–25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 75 | 175 | 2.3 | 4.2 | 40 | 160 | ---- | ---- | .5 | .8 | 80 | 70 | 70 |
| Madison fine sandy loam, eroded moderately steep phase | 14–25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 70 | 175 | 1.2 | 4.2 | 35 | 155 | ---- | ---- | .4 | .6 | 80 | 70 | 70 |
| Madison fine sandy clay loam, severely eroded very gently sloping phase | 2–7 | 250 | 325 | 10 | 45 | 20 | 40 | 8 | 15 | 20 | 40 | 100 | 200 | 1.5 | 4.7 | 55 | 185 | (4) | 1.5 | 1.5 | 1.8 | [3] 80 | [3] 70 | [3] 70 |
| Madison fine sandy clay loam, severely eroded gently sloping phase | 7–10 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 75 | 190 | 1.3 | 4.3 | 40 | 170 | ---- | ---- | 1.0 | 1.3 | 80 | 70 | 70 |
| Madison fine sandy clay loam, severely eroded sloping phase | 10–14 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 75 | 190 | 1.3 | 4.3 | 40 | 170 | ---- | ---- | 1.0 | 1.3 | 80 | 70 | 70 |
| Madison fine sandy clay loam, severely eroded moderately steep phase | 14–25 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 70 | 175 | 1.2 | 4.2 | 35 | 160 | ---- | ---- | .7 | .8 | 80 | 70 | 70 |
| Masada fine sandy loam, very gently sloping phase | 2–7 | 300 | 500 | 25 | 75 | 25 | 50 | 12 | 20 | 35 | 70 | 130 | 210 | 2.3 | 5.0 | 70 | 190 | (4) | 2.0 | 1.5 | 1.8 | ---- | [3] 70 | [3] 80 |
| Masada fine sandy loam, eroded gently sloping phase | 7–10 | 300 | 450 | 20 | 50 | 25 | 35 | 10 | 20 | 30 | 65 | 110 | 200 | 2.0 | 4.8 | 60 | 180 | (4) | 1.5 | 1.1 | 1.3 | ---- | 70 | 80 |
| Seneca fine sandy loam | 0–2 | 350 | 550 | 30 | 85 | 35 | 60 | 10 | 20 | 45 | 75 | 175 | 270 | 3.0 | 6.2 | 90 | 225 | (4) | 2.0 | 1.6 | 1.9 | [3] 105 | [3] 70 | ---- |
| Severely gullied land | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Starr loam | 0–2 | 350 | 500 | 35 | 90 | 40 | 65 | 15 | 25 | 50 | 90 | 175 | 275 | 3.0 | 6.3 | 90 | 235 | (4) | 3.0 | 1.8 | 2.0 | [3] 105 | [3] 70 | ---- |
| Thurmont and Braddock fine sandy loams, very gently sloping phases | 2–7 | 250 | 500 | 20 | 75 | 25 | 50 | 8 | 15 | 30 | 65 | 130 | 270 | 2.3 | 6.2 | 70 | 225 | (4) | 2.5 | 1.2 | 1.5 | [3] 80 | [3] 80 | [3] 90 |
| Thurmont and Braddock fine sandy loams, eroded very gently sloping phases | 2–7 | 225 | 450 | 18 | 65 | 20 | 45 | 8 | 15 | 30 | 65 | 120 | 260 | 2.2 | 6.0 | 65 | 220 | (4) | 2.0 | 1.0 | 1.2 | 80 | 80 | 90 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Thurmont and Braddock fine sandy loams, severely eroded sloping phases | 7–14 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 70 | 210 | 1.5 | 5.0 | 45 | 190 | ---- | ---- | 1.0 | 1.2 | 80 | 80 | 90 |
| Wehadkee silt loam | 0–2 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 40 | 120 | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Wickham fine sandy loam, very gently sloping phase | 1–7 | 350 | 600 | 35 | 70 | 30 | 60 | 10 | 20 | 40 | 75 | 140 | 240 | 2.5 | 6.2 | 75 | 220 | (4) | 3.0 | 1.6 | 1.8 | [3] 90 | [3] 70 | [3] 80 |
| Wickham fine sandy loam, eroded very gently sloping phase | 2–7 | 325 | 550 | 30 | 65 | 30 | 55 | 10 | 20 | 40 | 75 | 135 | 220 | 2.3 | 5.8 | 70 | 210 | (4) | 2.5 | 1.4 | 1.6 | 90 | 70 | 80 |
| Wickham fine sandy loam, eroded sloping phase | 7–15 | 250 | 425 | 30 | 65 | 25 | 50 | 10 | 20 | 40 | 75 | 120 | 210 | 2.1 | 5.5 | 45 | 175 | (4) | 2.5 | 1.5 | 1.8 | 90 | 70 | 80 |
| Worsham sandy loam, level phase | 0–2 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 40 | 120 | ---- | ---- | .7 | .9 | [3] 60 | [3] 50 | ---- |
| Worsham sandy loam, very gently sloping phase | 2–7 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 40 | 140 | ---- | ---- | .6 | .7 | 60 | 50 | ---- |
| Worsham sandy loam, eroded very gently sloping phase | 2–7 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 30 | 100 | ---- | ---- | .4 | .6 | 60 | 50 | ---- |
| Worsham sandy loam, severely eroded sloping phase | 7–15 | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | ---- | 25 | 75 | ---- | ---- | ---- | ---- | 60 | 50 | ---- |

[1] The site index is the height of a tree after 50 years of growth.
[2] Number of days that 1 cow can be grazed on 1 acre during 1 year without injury to the pasture.
[3] Based on site index studies made in northern Georgia in 1956.
[4] Yields for alfalfa are not given in column A because only the best known management is used for alfalfa.
[5] According to the 1956 studies, the site index for white pine is 100.

The best rates of fertilization for crops—rates that generally give the yields in columns B—are more than twice those commonly used. For cotton, the best rate used is 600 pounds of 4–12–12 plus 32 to 40 pounds of nitrogen. For corn, the best rate used is about 600 to 800 pounds of 4–12–12 or 5–10–10 plus 50 to 65 pounds of nitrogen. Good fescue sod or some other suitable sod is turned under to improve the soil. Grain sorghum is fertilized at about the same rate as corn. The best fertilization used for wheat and oats, per acre, is 400 to 600 pounds of 5–10–10 plus 32 to 48 pounds of nitrogen.

Coastal bermudagrass is used for both hay and pasture. For yields in columns A, 200 to 300 pounds of 4–12–12 are applied per acre and applications of chicken litter are added. The best rate used, which generally gives the estimated yields in columns B, is 500 to 600 pounds of 4–12–12, 32 to 64 pounds of nitrogen, and 2 to 3 tons of chicken litter per acre.

The estimated yields for permanent pasture in column A are for pasture to which practically no amendments are added other than an occasional load of chicken litter. Yields in column B for permanent pasture are for a suitable grass mixture that is limed and fertilized with 400 to 600 pounds of 4–12–12 per acre, and is topdressed, when needed, with 32 to 48 pounds of nitrogen.

Because only the best known management is used for alfalfa, yields are not given in column A for this crop. The fertilization necessary to obtain the yields in column B is heavy. The pH value is raised to 6.5 or 7.0 by applying lime. Then 600 to 1,000 pounds of 4–12–12 and 20 to 30 pounds of borax are applied per acre before seeding. The stand is maintained by adding 800 to 1,000 pounds of 0–10–20 and 20 pounds of borax annually.

For the yields of lespedeza given in column A, the lespedeza is seeded in small grain, and the hay is harvested without additional fertilizer. For the yields in column B, 200 to 400 pounds of 4–12–12 is applied after the grain is cut.

Those farmers in the county who are obtaining yields as high as those given in columns B are practicing good soil management other than adequate fertilization. They are:

1. Using good crop varieties that are suitable for the soils of the county.
2. Returning available chicken, barnyard, and green manure to the soil in order to maintain a supply of nitrogen and fresh organic matter.
3. Preparing seedbeds with reasonable care and carefully selecting the times and rates of planting.
4. Using suitable measures to control weeds, insects, and disease.

## Woodland Management

The early settlers found practically all of what is now Forsyth County covered with trees, mainly hardwoods but some pines. Some of the forests had been burned. Now about 35 percent of the county is wooded. Some areas have been cut many times, and the stand of saw timber in these areas is generally sparse and of poor quality. Many cleared areas are reverting to forest, but the quality of the stand is low. Other cleared areas are reverting to pasture of native grasses and undesirable briers, brush, vines, and weeds. A better use for these areas would be woodland. Good forest would improve the economy of the county.

The main requirements of good forest management are: (1) Protection of trees from fire, trampling, and other causes of damage; (2) systematic cutting and harvesting; and (3) maintaining a good stand.

In most places the planting of suitable seedlings is necessary, although many areas will revert to woodland naturally if the young stand is protected from fire and from grazing. The soil must be prepared for tree planting in advance. Eroded areas ought to be broken and mulched. Gullies need low check dams that are made of brush or other material. Furrows should be plowed on the contour. It is necessary to use species of trees that suit the slope, erosion, exposure, water relations, and other characteristics of the soil.

Some of the trees suited to the county are loblolly, shortleaf, Virginia, and white pines. Site indexes for all these trees except white pine are given in table 1 for most soils in the county. The site index is the expected height of a tree, in feet, after 50 years of growth. In 1956 a field study was made in Georgia to determine, by actual measurement, the site indexes for several species of trees on various kinds of soils. Many of the soils that were included in this study occur in Forsyth County, and for these soils the site indexes given in table 1 are from the actual measurements. For soils on which actual measurements were not made, the site indexes are estimates.

Trees have uses other than producing wood products. A protective layer of forest litter absorbs the impact of rain and preserves the tiny channels between the soil particles. When forest litter is consumed by fungi, bacteria, and tiny animals, humus is produced that improves the physical structure of the soil. The litter and humus have a great capacity for absorbing water. When roots decay, they leave channels that increase the porosity of the soil. If forest cover is properly maintained, a soil that has second-growth trees does not lose its porosity unless it is grazed or unless the litter is destroyed by fire.

# *Engineering Applications*

Soil engineering is well established today. It is, in a broad sense, a subdivision of structural engineering, for it deals with soils used as foundations on which structures are built and with soil used as structural material.

To the engineer, soils are natural materials that have various engineering properties. These properties may vary widely from place to place, even within the small area of a single project. Much of soil engineering concerns locating various soils, determining their engineering properties, correlating these properties with the requirements of the job, and selecting the best possible soil material for each job.

Most of the information in this section is in table 2, which lists properties of some of the soils in the county and rates the suitability of these soils for engineering uses.

The dominant texture, the permeability, and ratings for the shrink-swell potential are given for layers of the soils. The depth and thickness of these layers are not

necessarily the same as those for the layers in the soil profile descriptions. The layers considered in table 2 are those significant to engineering.

A knowledge of the texture of the soil material is useful to engineers; it helps them locate materials that are suitable for construction uses. Soil material having a high percentage of sand and gravel is better for most construction uses than material having a high percentage of silt and clay.

The shrink-swell potential is given three ratings—low, moderate, and high. In road building, particularly, it is important to know the location of poorly drained soils and to know whether or not the soil material swells and shrinks.

A knowledge of the suitability of the soil material for topdressing is useful in indicating whether a layer of soil can be used to topdress the slopes on cuts and fills so that protective vegetation will grow. Topdressing is also used on the shoulders of roads and in ditches.

The depth to bedrock and the kind of bedrock are important to almost all agricultural engineering. A knowledge of the bedrock is particularly useful in road building and in terracing.

The runoff potential has been rated according to the capacity of the soil to take in water during periods of sustained rainfall. In determining the ratings, the profile and the underlying unconsolidated parent material were considered. It was assumed that the soil had natural drainage and a uniform plant cover and that the rain had fallen long enough to wet the soil and allow it to swell. Cecil sandy loam, very gently sloping phase, which has been given a "medium" rating, was used as a basis. The ratings are *low* for deep, sandy soils with rapid permeability; *medium* for sandy soils with moderately rapid permeability (Cecil sandy loam, very gently sloping phase); *high* for silty and clayey soils with moderately slow permeability; and *very high* for shallow soils that have a nearly impermeable layer. No soil in table 2 has very high runoff potential.

Ratings are also given for the suitability of the soils for farm-pond sites and for use as embankment material for pond dams. Most farm ponds are built in small drainways, and it is necessary to select a site that has a compactible soil material and nonporous bedrock. Embankment material ought to be compactible and be able to withstand excessive seepage.

In determining the suitability of the soils for terracing, the main considerations were slope, depth of the soil, and the content of stone or the amount of rock outcrops.

The suitability for sprinkler systems has been rated according to the soil depth and the capacity of the soil to take in water from the surface. The availability of water was not considered. The capacity of the soil to take in water depends on the slope and on the texture and structure of the soil. In Forsyth County, very little acreage is suitable for sprinkler irrigation because of steepness, lack of sources of water, and erosion. No furrow irrigation and only a few sprinkler systems are used.

Only two ratings—*not suitable* and *good*—are given for suitability of the soil for septic tanks and drainage fields and for building foundations. Septic tanks are used in Forsyth County on modern farms.

499959—60——2

## *Soil Survey Methods and Definitions*

The scientist who makes a soil survey examines soils in the field, classifies them in accordance with the facts he observes, and maps their boundaries on an aerial photograph or other map.

FIELD STUDY: The soil surveyor bores or digs many holes to see what the soils are like. These holes are not spaced in a regular pattern but are located according to the lay of the land. Usually they are not more than a quarter of a mile apart, and sometimes they are much closer. In most soils each boring or hole reveals several distinct layers, called horizons, which collectively are known as the soil profile. Each layer is studied to see how it differs from others in the profile, and to learn things about the soil that affect its capacity to produce plants.

*Color* is usually related to the content of organic matter. A dark soil generally contains more organic matter than a light one. Soils that have spots of gray, yellow, and brown in the lower layers are generally poorly drained and poorly aerated.

*Texture*, which is the proportion of sand, silt, and clay that makes up a soil, is judged by the way the soil feels when it is rolled between the fingers. Later the content of sand, silt, and clay may be checked in the laboratory. Texture has much to do in determining how well the soil retains moisture, natural plant nutrients, and fertilizer, and how difficult it is to cultivate.

*Structure* is the arrangement of the variously shaped soil particles into larger aggregates, or peds, and the amount and arrangement of the pore space between these particles and peds. By observing structure, the scientist can judge permeability, or how easily moisture, air, and plant roots can penetrate the soil.

*Consistence* terms are used to describe the tendency of the soil particles and peds to crumble or stick together or the resistance of the soil to deformation or rupture. Common terms are friable, plastic, hard, brittle, and crumbly. Consistence indicates how difficult it is to keep the soil open and porous during cultivation.

*Other characteristics* observed in the field and considered in classifying the soil include the following: The depth of the soil over bedrock or compact layers; the presence of gravel or stones in amounts that will impede cultivation; the steepness and pattern of the slopes; the degree of erosion; the nature of the underlying parent material from which the soil has developed; and the acidity or alkalinity of the soil as measured by chemical tests.

CLASSIFICATION: On the basis of the characteristics observed by the survey team or determined by laboratory tests, soils are classified in phases, types, and series. The soil type is the basic classification unit; it may consist of several phases. Types that resemble each other in most of their characteristics are grouped into soil series.

*Soil type.*—Soils similar in kind, thickness, and arrangement of soil layers are classified as one soil type.

*Soil phase.*—Because of differences other than those of kind, thickness, and arrangement of the layers, some soil types are divided into two or more phases. In Forsyth County, most soil types are divided into phases on the basis of range of slope and degree of erosion. Eroded

TABLE 2.—*Soil properties important to engineering, for selected soils, and*

| Soil | Properties of soil material in place, by layers | | | | Suitability of soil material for top dressing by layers | Properties of soil as a whole |
|---|---|---|---|---|---|---|
| | Depth | Dominant texture | Permeability | Shrink-swell potential | | Bedrock and its depth |
| | *Inches* | | *Inches per hour* | | | |
| Alluvial land, moderately well drained | 0–24 | Variable | 0.80–10.0 | Low | Fair | Gneiss and schist at 9 to 12 feet. |
| | 24–64 | Variable | .80–10.0 | Low | Fair. | |
| Altavista fine sandy loam, level phase | 0–16 | Fine sandy loam | .80– 2.5 | Low | Good | Schist and mica schist at 15 feet. |
| | 16–65 | Sandy clay loam | .20– .8 | Moderate | Good. | |
| Appling sandy loam, very gently sloping phase. | 0– 8 | Sandy loam | 2.50– 5.0 | Low | Good | Granite and granite-gneiss at 8 feet. |
| | 8–37 | Sandy clay loam | .20– .8 | Moderate | Good. | |
| | 37–48 | Weathered rock | .20– .8 | Low | Good. | |
| Buncombe loamy fine sand | 0–25 | Loamy fine sand | 10.0+ | Low | Fair | Gneiss and schist at 9 to 15 feet. |
| Cecil sandy loam, very gently sloping phase. | 0–16 | Sandy loam | 2.50– 5.0 | Low | Good | Granite and granite-gneiss at 8 feet. |
| | 16–48 | Clay loam | .80– 2.5 | Moderate | Good. | |
| | 48–60 | Weathered rock | .80– 2.5 | Low | Good. | |
| Chewacla silt loam | 0–14 | Silt loam | .80– 2.5 | Low | Poor | Gneiss and schist at 9 to 12 feet. |
| | 14–30+ | Silt loam | .80– 2.5 | Low | Poor. | |
| Congaree silt loam | 0–21 | Silt loam | 2.50– 5.0 | Low | Fair | Gneiss and schist at 9 to 12 feet. |
| | 21–35+ | Silt loam | 2.50– 5.0 | Low | Fair. | |
| Edgemont stony sandy loam, moderately steep phase. | 0–11 | Sandy loam | 2.50– 5.0 | Low | Good | Quartzite at 5 feet. |
| | 11–50 | Sandy clay loam | .80– 2.5 | Low | Good. | |
| Gullied land (all materials) | 0–36 | Clay loam | .80– 2.5 | Moderate | Good | Granite and gneiss at 8 feet. |
| | 36–48 | Clay loam | .80– 2.5 | Low | Good. | |
| Habersham stony fine sandy loam, moderately steep phase. | 0–11 | Sandy loam | 5.00–10.0 | Low | Good | Quartzite at 4 feet. |
| | 11–17 | Sandy clay loam | .08– 2.5 | Low | Good. | |
| | 17–36 | Weathered quartz and rock. | 5.00–10.0 | Low | Good. | |
| Hiwassee fine sandy loam, eroded gently sloping phase. | 0–10 | Fine sandy loam | 2.50– 5.0 | Low | Good | Basic and acid gneiss and schist at 15 feet. |
| | 10–44 | Clay loam | .80– 2.5 | Moderate | Good. | |
| | 44–84+ | Sand and gravel | 5.00–10.0 | Low | Good. | |
| Lloyd loam, very gently sloping phase | 0–15 | Loam | 2.50– 5.0 | Low | Good | Hornblende gneiss at 3 to 8 feet. |
| | 15–59 | Clay | .20– .8 | Moderate | Fair. | |
| | 59–68 | Clay loam | .20– .8 | Moderate | Fair. | |
| | 68–78 | Loam | .80– 2.5 | Low | Good. | |
| Louisa fine sandy loam, moderately steep phase. | 0– 8 | Fine sandy loam | 5.00–10.0 | Low | Good | Schist and gneiss at 5 feet. |
| | 8–16 | Silty clay loam | 2.50– 5.0 | Moderate | Fair. | |
| | 16–50 | Loam | 2.50– 5.0 | Low | Fair. | |
| Louisburg sandy loam, eroded gently sloping phase. | 0–10 | Sandy loam | 5.00–10.0 | Low | Good | Granite and gneiss at depth of 3 feet. |
| | 10–30 | Loam | 5.00–10.0 | Low | Good. | |
| Madison fine sandy loam, eroded gently sloping phase. | 0–12 | Fine sandy loam | 2.50– 5.0 | Low | Good | Schist and gneiss at 9 feet. |
| | 12–37 | Clay loam | .80– 2.5 | Moderate | Fair. | |
| | 37–60 | Quartz mica schist | 2.50– 5.0 | Low | Fair. | |
| Masada fine sandy loam, very gently sloping phase. | 0– 6 | Fine sandy loam | 2.50– 5.0 | Low | Good | Gneiss and schist at 12 feet. |
| | 6–28 | Silty clay loam | .80– 2.5 | Moderate | Good. | |
| | 28–40+ | Sandy clay loam | .80– 2.5 | Low | Good. | |
| Seneca fine sandy loam | 0–32 | Fine sandy loam | 2.50– 5.0 | Low | Good | Gneiss and schist at 4 feet. |
| | 32–40+ | Variable | 2.50– 5.0 | Low | Good. | |
| Starr loam | 0– 4 | Loam | 2.50– 5.0 | Low | Fair | Basic and acid gneiss and schist at 5 feet. |
| | 4–40+ | Clay loam | 2.50– 5.0 | Low | Fair. | |
| Thurmont and Braddock fine sandy loams, very gently sloping phases. | 0–10 | Fine sandy loam | 2.50– 5.0 | Low | Good | Gneiss and schist at 2 to 10 feet. |
| | 10–92 | Sandy clay loam | 2.50– 5.0 | Low | Good. | |

*suitability of these soils for some agricultural engineering purposes*

| Properties of soil as a whole—Continued | | Suitability of soil as a whole for— | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Runoff potential [1] | Depths to water tables | Farm ponds | | Terraces | Sprinkler systems (availability of water not considered) | Earthwork during long wet period | Septic tanks and drainage fields | Building foundations |
| | | Site | Embankment material | | | | | |
| | *Feet* | | | | | | | |
| Medium | 5–8 | Good | Fair | Not suitable (bottom land) | Good | Fair | Not suitable | Not suitable. |
| High | 5–25 | Good | Good | Good | Good | Fair | Good | Good. |
| Medium | 30–90 | Good | Good | Good | Good | Fair | Good | Good. |
| Medium | 6–15 | Not suitable | Fair | Not needed | Good | Good | Not suitable | Not suitable. |
| Medium | 50–120 | Good | Good | Good | Good | Good | Good | Good. |
| High | 4–7 | Good | Fair | Not suitable (bottom land). | Good | Poor | Not suitable | Not suitable. |
| Medium | 15 | Good | Fair | Not suitable | Good | Not suitable | Not suitable | Not suitable. |
| Medium | 50–150 | Good | Good | Not suitable | Not suitable | Very good | Good | Good. |
| Medium | 50–90 | Good | Not suitable | Not suitable | Not suitable | Good | Good | Good. |
| Medium | 50–150 | Good | Good | Not suitable | Not suitable | Very good | Good | Good. |
| Medium | 40–70 | Fair | Good | Good | Good | Good | Good | Good. |
| Medium | 65–90 | Fair | Fair | Good | Fair | Fair | Good | Good. |
| Medium | 65–100 | Good | Fair | Not suitable | Not suitable | Good | Good | Good. |
| Medium | 65–100 | Good | Fair | Poor | Not suitable | Good | Good | Good. |
| Medium | 50–100 | Good | Good | Good | Good | Good | Good | Good. |
| Medium | 30–60 | Good | Good | Good | Good | Good | Good | Good. |
| Medium | 30–50 | Good | Poor | Not suitable | Good | Fair | Not suitable | Not suitable. |
| Medium | 30–50 | Good | Poor | Not suitable | Good | Fair | Not suitable | Not suitable. |
| Medium | 35–100 | Good | Good | Good | Good | Good | Good | Good. |

TABLE 2.—*Soil properties important to engineering, for selected soils, and*

| Soil | Properties of soil material in place, by layers | | | | Suitability of soil material for top dressing by layers | Properties of soil as a whole |
|---|---|---|---|---|---|---|
| | Depth | Dominant texture | Permeability | Shrink-swell potential | | Bedrock and its depth |
| | *Inches* | | *Inches per hour* | | | |
| Wehadkee silt loam | 0– 8 | Silt loam | .20– .8 | Low | Poor | Gneiss and schist at 9 to 12 feet. |
| | 8–40+ | Silty clay loam | .05– .2 | Low | Poor. | |
| Wickham fine sandy loam, very gently sloping phase. | 0– 9 | Fine sandy loam | 2.50– 5.0 | Low | Good | Granite and schist at 12 feet. |
| | 9–46 | Sandy clay loam | .80– 2.5 | Moderate | Good. | |
| | 46–66+ | Clay loam | .80– 2.5 | Moderate | Good. | |
| Worsham sandy loam, level phase | 0– 4 | Sandy loam | 2.50– 5.0 | Low | Good | Granite at 10 feet. |
| | 4–21 | Sandy clay loam | .05– .2 | Moderate | Good. | |
| | 21–32 | Sandy clay loam | .20– .8 | Low | Good. | |
| | 32–48 | Sandy loam | .20– .8 | Low | Good. | |

phases have had one-fourth to three-fourths of their surface soil removed; severely eroded phases have had more than three-fourths of their surface soil removed, and generally part of their subsoil. Soils that have been more than severely eroded are called Gullied land or Severely gullied land, which are miscellaneous land types.

The soil phase (or soil type if it has not been subdivided) is the unit shown on the soil map. It is the unit that has the narrowest range of characteristics. Use and management, therefore, can be specified more easily for soil phases than for soil series or yet broader groups that allow more variation.

*Soil series.*—Two or more soil types that differ in surface texture, but are otherwise similar in kind, thickness, and arrangement of soil layers, are normally designated as a soil series. The name of a soil series is generally chosen from the place names near where the series was first found.

*Miscellaneous land types.*—Areas that have little soil are not classified in types and series but are identified by descriptive names, such as Gullied land, acid materials, and Severely gullied land.

*Undifferentiated soil groups.*—This kind of mapping unit has two or more similar soils that do not occur in regular geographic association. Thurmont and Braddock fine sandy loams, very gently sloping phases, is an undifferentiated soil group in Forsyth County.

SOIL CORRELATION: This is the process of assigning uniform names to soils of various areas in a nationwide system of mapping and classifying soils. The purpose of soil correlation is to show similarities and differences among the soils of each surveyed area and the rest of the United States. To do this, the same combination of soil characteristics is given the same name, wherever found.

* * *

A more detailed discussion of the methods used in soil surveying can be found in the Soil Survey Manual (*6*). Fuller definitions of some of the preceding terms and definitions of other unfamiliar terms used in this report can be found in the Glossary.

# *Soils of Forsyth County*

The soils of Forsyth County developed in a climate that has moderately high temperature and moderately heavy rainfall. The native vegetation consisted mainly of deciduous hardwoods. Although the climate and vegetation in the county were uniform, there are differences in slope, kind of parent material, and length of time the parent material has been in place. These differences are reflected in differences among the various soils.

The soils are generally strongly acid. The surface soils are mainly fine sandy loams, sandy loams, or loams, but a few areas on the bottom land have a very sandy surface layer. The surface layer of the eroded soils ranges from fine sandy clay loam to clay loam. The most severely eroded areas have a clay loam plow layer.

Most of the acreage has only a few stones, but some is stony enough to prevent cultivation, and some is so stony that it cannot be used for pasture. The stones are mainly fragments and outcrops of quartzite.

The soils are nearly level to steep. Almost all of the nearly level areas are on first bottoms. The steeper areas are along drainways in the Cecil-Habersham general soil area.

## Soil Series and Their Relations

To make full use of this survey, it is necessary to know the soils and to understand how they are related to each other. These relations can be shown by discussing the soils in these topographic groups: (1) Soils on uplands; (2) soils on terrace lands; (3) soils at the base of slopes; and (4) soils on bottom lands.

*suitability of these soils for some agricultural engineering purposes*—Continued

| Properties of soil as a whole—Continued | | Suitability of soil as a whole for— | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Runoff potential [1] | Depths to water tables | Farm ponds | | Terraces | Sprinkler systems (availability of water not considered) | Earthwork during long wet period | Septic tanks and drainage fields | Building foundations |
| | | Site | Embankment material | | | | | |
| | *Feet* | | | | | | | |
| Very high | 0–2 | Good | Not suitable | Not suitable | Fair | Not suitable | Not suitable | Not suitable. |
| Medium | 30–50 | Good | Good | Good | Good | Good | Good | Good. |
| High | 10–30 | Fair | Not suitable | Not suitable | Not suitable | Poor | Not suitable | Not suitable. |

[1] The ratings are *low* for deep, sandy soils with rapid permeability; *medium* for sandy soils with moderately rapid permeability (Cecil sandy loam, very gently sloping phase); *high* for silty and clayey soils with moderately slow permeability; and *very high* for shallow soils that have a nearly impermeable layer.

SOILS ON UPLANDS: These soils make up about 87.8 percent of the total area of the county. They have developed in place from material weathered from the parent rock. Their characteristics are generally related to those of the parent rock. In Forsyth County, the main kinds of parent rock are granite, gneiss, schist, quartzite, hornblende gneiss, mica schist, and quartz mica schist. Different kinds of soil are developed from these different kinds of parent rock.

The Appling and Louisburg soils developed from granite and gneiss. The parent rock, which has coarse to fine texture, weathered to a residuum that contains much quartzite sand. The surface soil that formed is dark-gray to dark reddish-gray sandy loam, and the subsoil is yellowish-red to reddish-brown sandy clay loam to loam.

The Cecil soils are developed from parent material weathered from gneiss, schist, and, to a lesser degree, from granite. These soils have a dark reddish-gray to dark-gray sandy loam surface soil and a reddish-brown to red clay loam subsoil.

The Edgemont and Habersham soils developed chiefly in material weathered from quartzite. Most areas of these soils are stony. The Edgemont soils have a dark-brown, stony sandy loam surface soil that is underlain by a yellowish-brown sandy clay loam subsoil. The Habersham soils differ from the Edgemont soils in being strong brown to yellowish red in the subsoil.

Lloyd soils developed from material weathered from hornblende gneiss. They have a red, firm, clay subsoil and weathered rock at a depth of about 68 inches.

The Madison and Louisa soils developed from material weathered from mica schist, mica gneiss, or quartz mica schist. These soils normally are highly micaceous. The Madison soils have better developed horizons than the Louisa soils, which have a faint B horizon or no B horizon. The Louisa soils are on breaks along drainways and are steeper than the Madison soils, which are on broad interstream divides. Louisa and Madison soils have a fine sandy loam surface soil and a reddish, micaceous clay loam or silty clay loam subsoil.

SOILS ON TERRACE LANDS: In the distant past, the Chattahoochee River, the Etowah River, and other streams in the county flowed at higher levels than they now flow. At these higher levels they deposited gravel, sand, silt, and clay on their flood plains. During many years, the streams cut downward and deepened the channels. New flood plains were formed at lower levels, but remnants of the older, higher lying flood plains were left. These older areas, called terrace lands or second bottoms, consist of alluvium that lies above the overflow level of the present streams.

Soils on terrace lands make up about 1.5 percent of the county. They are in the Altavista, Hiwassee, Masada, and Wickham series. They differ from each other mainly in internal drainage and kinds of parent material.

SOILS AT THE BASE OF SLOPES: These soils are on nearly level to moderately steep colluvium or local alluvium. This material has been deposited at the base of higher lying upland soils or at the head of drainways in the uplands. It consists of soil and fragments of rock that rolled or were washed from higher slopes.

The Thurmont and Braddock soils have been in place a long time and have a well-defined surface soil and subsoil. The Worsham, Seneca, and Starr soils have been in place only a short time. Much of the acreage of the younger soils is next to the drainways, and some of it has impaired drainage. The older soils have good drainage. The soils at the base of slopes make up about 2.8 percent of the county.

SOILS ON BOTTOM LANDS: These soils are nearly level. They developed from material that has not been in place long enough for a well-defined surface soil and subsoil to form. The parent material of these soils was deposited by streams. Its characteristics depend largely upon the source of material and the speed of the streams when the

material was deposited. The soils adjacent to streams are susceptible to flooding (fig. 4).

The Buncombe and Congaree soils are the two best drained groups of soils on the bottom lands. The Buncombe soil is somewhat excessively drained. It developed

*Figure 4.*—**Soils on bottom lands: Center foreground, Buncombe loamy fine sand; left background, Chewacla silt loam; right background, Wehadkee silt loam.**

from coarse-textured material that was deposited by fast-moving water. The Congaree soils are well drained. They developed from finer textured material that was deposited from slower moving water.

The Chewacla soils are moderately well drained to somewhat poorly drained. They developed from mixed fine material.

The Wehadkee soil is poorly drained. It developed in material that varied in texture from place to place.

Some areas on bottom lands that have extremely variable texture are mapped as Alluvial land, poorly drained, and Alluvial land, moderately well drained. The bottom lands make up about 7.9 percent of the county.

## Soil Series, Types, and Phases

This subsection is provided for those who want detailed information about the soils in the county. It describes the single soils, or mapping units; that is, the areas on the detailed map that are bounded by lines and identified by a symbol. For more general information about the soils, the reader can refer to the section, General Soil Areas, in which the broad patterns of soils are discussed.

An important part of this subsection is the series description. The series description includes statements about the general nature of the soils in the series, as well as the relation of these soils to soils in other series. It also includes statements on topography, drainage, native vegetation, and use of the soils.

Following the series description there are descriptions of the single soils in each series. All the soils in one series that have the same texture are together. For example, all Appling soils that have a sandy loam surface soil are together, and then all Appling soils that have a sandy clay loam surface soil. The description of the first soil in each series contains a profile description that is generally representative of the soils in the series. The soils that follow, as a rule, are discussed in relation to the first soil described in the series. If a mapping unit contains inclusions of other soils, these are named in the description of the mapping unit.

In describing soils, the scientist frequently assigns a letter symbol and a subscript, for example, "$A_1$," to the various layers. These symbols have a special meaning that concerns scientists and others who make a special study of soils. Most readers will need to remember only that all letter symbols beginning with "A" are for surface soil; those beginning with "B" are for subsoil; those beginning with "C" are for substratum, or parent material; and those beginning with "D" are for underlying material that is different from the material above.

The color of a soil can be described in words, such as yellowish brown, or can be stated in much more precise terms given by symbols that indicate hue, value, and chroma, such as 10YR 5/4. Precise symbols of this kind, called Munsell notations, are given along with words that tell the color of most soil horizons.

The location and distribution of the single soils are shown on the soil map near the back of this report. Their approximate acreage and proportionate extent are given in table 3. It will be helpful to refer to the section, Soil Survey Methods and Definitions, where "series," "types," "phases," and other special terms used in describing soils are defined.

TABLE 3.—*Approximate acreage and proportionate extent of the soils mapped*

| Soil | Area | Extent | Soil | Area | Extent |
|---|---|---|---|---|---|
| | *Acres* | *Percent* | | *Acres* | *Percent* |
| Alluvial land, moderately well drained | 5, 855 | 3. 8 | Appling sandy clay loam, eroded gently sloping phase | 1, 390 | 0. 9 |
| Alluvial land, poorly drained | 2, 124 | 1. 4 | Appling sandy clay loam, severely eroded gently sloping phase | 405 | . 3 |
| Altavista fine sandy loam, level phase | 167 | . 1 | Appling sandy clay loam, eroded sloping phase | 416 | . 3 |
| Altavista fine sandy loam, very gently sloping phase | 287 | . 2 | Appling sandy clay loam, severely eroded sloping phase | 454 | . 3 |
| Altavista fine sandy loam, eroded very gently sloping phase | 105 | . 1 | Appling sandy clay loam, severely eroded moderately steep phase | 409 | . 3 |
| Appling sandy loam, very gently sloping phase | 1, 996 | 1. 3 | Buncombe loamy fine sand | 454 | . 3 |
| Appling sandy loam, gently sloping phase | 379 | . 2 | Cecil sandy loam, very gently sloping phase | 3, 172 | 2. 0 |
| Appling sandy loam, sloping phase | 242 | . 2 | Cecil sandy loam, eroded very gently sloping phase | 13, 200 | 8. 5 |
| Appling sandy loam, moderately steep phase | 284 | . 2 | | | |
| Appling sandy clay loam, eroded very gently sloping phase | 1, 763 | 1. 1 | | | |

TABLE 3.—*Approximate acreage and proportionate extent of the soils mapped*—Continued

| Soil | Area | Extent |
|---|---|---|
| | *Acres* | *Percent* |
| Cecil sandy loam, gently sloping phase | 1, 322 | 0. 8 |
| Cecil sandy loam, eroded gently sloping phase | 9, 756 | 6. 3 |
| Cecil sandy loam, sloping phase | 2, 060 | 1. 3 |
| Cecil sandy loam, eroded sloping phase | 4, 383 | 2. 8 |
| Cecil clay loam, severely eroded very gently sloping phase | 1, 985 | 1. 3 |
| Cecil clay loam, severely eroded gently sloping phase | 6, 761 | 4. 3 |
| Cecil clay loam, severely eroded sloping phase | 9, 699 | 6. 2 |
| Cecil clay loam, severely eroded moderately steep phase | 11, 100 | 7. 1 |
| Cecil clay loam, severely eroded steep phase | 961 | . 6 |
| Cecil fine sandy loam, eroded very gently sloping phase | 815 | . 5 |
| Cecil fine sandy loam, gently sloping phase | 205 | . 1 |
| Cecil fine sandy loam, eroded gently sloping phase | 983 | . 6 |
| Cecil fine sandy loam, sloping phase | 407 | . 3 |
| Cecil fine sandy loam, eroded sloping phase | 765 | . 5 |
| Cecil fine sandy loam, moderately steep phase | 10, 794 | 6. 9 |
| Cecil fine sandy loam, eroded moderately steep phase | 4, 165 | 2. 7 |
| Cecil fine sandy loam, steep phase | 5, 290 | 3. 4 |
| Chewacla silt loam | 1, 273 | . 8 |
| Congaree silt loam | 469 | . 3 |
| Congaree fine sandy loam | 1, 085 | . 7 |
| Edgemont stony sandy loam, moderately steep phase | 1, 542 | 1. 0 |
| Edgemont stony sandy loam, eroded very gently sloping phase | 334 | . 2 |
| Edgemont stony sandy loam, gently sloping phase | 587 | . 4 |
| Edgemont stony sandy loam, eroded sloping phase | 476 | . 3 |
| Edgemont stony sandy loam, eroded moderately steep phase | 501 | . 3 |
| Edgemont stony sandy loam, steep phase | 2, 862 | 1. 8 |
| Gullied land, acid materials | 12, 200 | 7. 8 |
| Gullied land, Lloyd materials | 437 | 3 |
| Habersham stony fine sandy loam, moderately steep phase | 628 | . 4 |
| Habersham stony fine sandy loam, eroded very gently sloping phase | 225 | . 1 |
| Habersham stony fine sandy loam, sloping phase | 247 | . 2 |
| Habersham stony fine sandy loam, severely eroded sloping phase | 156 | . 1 |
| Habersham stony fine sandy loam, severely eroded moderately steep phase | 269 | . 2 |
| Hiwassee fine sandy loam, eroded gently sloping phase | 247 | . 2 |
| Hiwassee fine sandy clay loam, eroded sloping phase | 89 | . 1 |
| Lloyd loam, very gently sloping phase | 310 | . 2 |
| Lloyd loam, eroded very gently sloping phase | 1, 142 | . 7 |
| Lloyd loam, eroded gently sloping phase | 1, 302 | . 8 |
| Lloyd loam, eroded sloping phase | 464 | . 3 |
| Lloyd loam, moderately steep phase | 261 | . 2 |
| Lloyd loam, eroded moderately steep phase | 248 | . 2 |
| Lloyd clay loam, severely eroded very gently sloping phase | 145 | . 1 |
| Lloyd clay loam, severely eroded gently sloping phase | 543 | 0. 3 |
| Lloyd clay loam, severely eroded sloping phase | 608 | . 4 |
| Lloyd clay loam, severely eroded moderately steep phase | 689 | . 4 |
| Louisa fine sandy loam, moderately steep phase | 647 | . 4 |
| Louisa fine sandy loam, eroded gently sloping phase | 240 | . 2 |
| Louisa fine sandy loam, eroded sloping phase | 270 | . 2 |
| Louisa fine sandy loam, steep phase | 1, 609 | 1. 0 |
| Louisa fine sandy clay loam, severely eroded moderately steep phase | 566 | . 4 |
| Louisburg sandy loam, eroded gently sloping phase | 524 | . 3 |
| Louisburg sandy loam, moderately steep phase | 255 | . 2 |
| Louisburg sandy loam, steep phase | 855 | . 5 |
| Madison fine sandy loam, eroded very gently sloping phase | 2, 092 | 1. 3 |
| Madison fine sandy loam, eroded gently sloping phase | 1, 885 | 1. 2 |
| Madison fine sandy loam, eroded sloping phase | 1, 107 | . 7 |
| Madison fine sandy loam, moderately steep phase | 700 | . 5 |
| Madison fine sandy loam, eroded moderately steep phase | 677 | . 4 |
| Madison fine sandy clay loam, severely eroded very gently sloping phase | 205 | . 1 |
| Madison fine sandy clay loam, severely eroded gently sloping phase | 590 | . 4 |
| Madison fine sandy clay loam, severely eroded sloping phase | 1, 495 | 1. 0 |
| Madison fine sandy clay loam, severely eroded moderately steep phase | 1, 680 | 1. 1 |
| Masada fine sandy loam, very gently sloping phase | 224 | . 1 |
| Masada fine sandy loam, eroded gently sloping phase | 170 | . 1 |
| Seneca fine sandy loam | 1, 058 | . 7 |
| Severely gullied land | 502 | . 3 |
| Starr loam | 520 | . 3 |
| Thurmont and Braddock fine sandy loams, very gently sloping phases | 243 | . 2 |
| Thurmont and Braddock fine sandy loams, eroded very gently sloping phases | 156 | . 1 |
| Thurmont and Braddock fine sandy loams, severely eroded sloping phases | 277 | . 2 |
| Wehadkee silt loam | 1, 106 | . 7 |
| Wickham fine sandy loam, very gently sloping phase | 389 | . 3 |
| Wickham fine sandy loam, eroded very gently sloping phase | 273 | . 2 |
| Wickham fine sandy loam, eroded sloping phase | 263 | . 2 |
| Worsham sandy loam, level phase | 252 | . 2 |
| Worsham sandy loam, very gently sloping phase | 313 | . 2 |
| Worsham sandy loam, eroded very gently sloping phase | 300 | . 2 |
| Worsham sandy loam, severely eroded sloping phase | 185 | . 1 |
| Total | 155, 520 | 100. 0 |

### *Alluvial land*

Alluvial land occurs on first bottoms in association with Congaree, Chewacla, Wehadkee, and Buncombe soils. It varies from place to place in color, texture, and drainage. It is likely to be flooded at times and to have sediments deposited and soil material washed away. It is medium acid to strongly acid. This land consists of recent alluvium that was washed mainly from Cecil, Appling, Madison, and Lloyd soils. The alluvium contains admixtures from Habersham and Edgemont soils.

Alluvial land is moderately extensive and is distributed throughout the county along the smaller streams. It is used for crops, pasture, and trees.

**Alluvial land, moderately well drained** (0 to 2 percent slopes) (Ab).—This mapping unit consists mainly of an intricate association of Buncombe, Congaree, and

Chewacla soils. Included are very small areas of poorly drained soils that are not mapped separately but are indicated on the map by drainage symbols.

This land is low in fertility and contains little organic matter, but it is easy to work and produces fair to good yields. Runoff is slow and internal drainage is medium. This land is rapidly permeable and has a moderately low capacity for holding water that plants can use. It has a medium range in use and responds fairly well to management.

Although this land has moderate risks of damage, it can be used intensively. Row crops can be grown continuously. More than half of this land is used for cultivated crops. Capability unit IIw–2.

**Alluvial land, poorly drained** (0 to 2 percent slopes) (Ac).—This land consists of poorly drained soils on first bottoms. It is associated with Wehadkee and Chewacla soils. It has a high water table, moderate permeability, and slow internal drainage. Response to management is fair to poor.

This land is too poorly drained to be used for cultivated crops, but it is suited to trees and permanent pasture. About 80 percent of this land is in trees, which include a growth of willow or alder. The rest is in pasture or is idle. Improved pasture has fair carrying capacity. Capability unit IVw–1.

### *Altavista series*

In this series are moderately well drained, light-colored soils on second bottoms and low terraces. These soils developed, under native hardwoods, from material that was washed from Cecil, Appling, Habersham, and Edgemont soils. They have a yellowish-brown subsoil that is mottled at a depth of about 33 inches.

Altavista soils are members of the same catena as the poorly drained Roanoke soils, which are not mapped in Forsyth County, and the well-drained Wickham soils. Their yellowish-brown, mottled subsoil differs from the red, unmottled subsoil of the Wickham soils.

These soils have a small total acreage. They are used for cultivated crops and are well suited to crops that are not sensitive to slow internal drainage.

**Altavista fine sandy loam, level phase** (0 to 2 percent slopes) (AcA).—The following describes a profile of this soil:

$A_p$ 0 to 10 inches, dark grayish-brown (2.5Y 4/2) fine sandy loam; weak, fine, granular structure; very friable; strongly acid; boundary gradual and smooth; 6 to 10 inches thick.

$A_2$ 10 to 16 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, medium, subangular blocky structure; very friable; strongly acid; boundary clear and smooth; 4 to 8 inches thick.

$B_2$ 16 to 33 inches, light olive-brown (2.5Y 5/6) sandy clay loam; moderate, coarse and medium, subangular blocky structure; friable; strongly acid; boundary clear and smooth; 4 to 8 inches thick.

$B_{31}$ 33 to 50 inches, light olive-brown (2.5Y 5/4) sandy clay loam; common, medium, distinct yellowish-brown (10YR 5/6) mottles; moderate, coarse, subangular blocky structure; friable; common, medium-sized, yellowish-brown concretions with black interiors; strongly acid; boundary gradual and smooth; 11 to 20 inches thick.

$B_{32}$ 50 to 56 inches, light olive-brown (2.5Y 5/4) sandy clay loam with many, coarse, distinct yellowish-red (5YR 5/6) mottles; moderate, coarse, subangular blocky structure; friable; many coarse concretions; strongly acid; boundary gradual and smooth; 4 to 8 inches thick.

C 56 to 65 inches, light olive-gray (5Y 6/2) sandy clay loam with many, coarse, distinct yellow (2.5Y 7/6) and yellowish-red (5YR 5/6) mottles; weak, coarse, subangular blocky structure; friable; strongly acid.

The color of the surface soil ranges from dark grayish brown to yellow and gray. The depth of the deposited parent material over the unrelated material varies from 30 to more than 65 inches. Included with this soil are some small areas of sandy loam.

Altavista fine sandy loam, level phase, has a moderately permeable surface soil and a moderately slowly permeable subsoil. Its available moisture-holding capacity is moderate. This soil is highly leached. It is deficient in lime, nitrogen, phosphorus, and potassium but responds well to fertilizer. Workability is good, but the soil warms slowly in spring.

Partly because the erosion hazard is slight, this soil can be cultivated continuously under ordinary management. More than 70 percent of the acreage is cleared and cultivated. Because internal drainage is moderately slow, this soil is only fairly well suited to moderately well suited to row crops. It is well suited to pasture and hay. Capability unit I–2.

**Altavista fine sandy loam, very gently sloping phase** (2 to 7 percent slopes) (AcB).—This soil is more sloping than Altavista fine sandy loam, level phase. It has medium runoff and slow internal drainage. The erosion hazard is slight.

This soil is suited to a wide variety of crops, but row crops should not be grown more than half of the time. Corn is the main row crop. Alfalfa and other crops that need a well-drained soil should not be grown. About 60 percent of the acreage is in crops, 10 percent is in trees, and 12 percent is in pasture. The rest is idle. Capability unit IIe–2.

**Altavista fine sandy loam, eroded very gently sloping phase** (2 to 7 percent slopes) (AcB2).—This soil has lost more than 75 percent of the surface soil through erosion. A few deep gullies have formed in places. Runoff is greater on this soil than it is on Altavista fine sandy loam, level phase. Erosion has reduced the available moisture-holding capacity, content of organic matter, and natural fertility, but the soil is easy to work.

This soil is moderately well suited to crops that are grown in a suitable cropping system. Yields are fair to poor. Pasture production is fair to good. About 73 percent of this soil is in crops, 10 percent is in pasture, and 7 percent is in trees. The rest is idle. Capability unit IIIe–2.

### *Appling series*

This series consists of moderately well drained, light-colored soils that developed in place from weathered granites, gneisses, and coarse-grained schist. These soils have a dark-gray, sandy loam surface soil underlain by a yellowish-red to reddish-yellow sandy clay loam subsoil that is mottled below depths of 31 to 37 inches. The soils are strongly acid. The native vegetation was hardwoods, mainly oaks, and some pines. Shortleaf pine volunteers rapidly on the abandoned fields.

Appling soils are mainly associated with the Cecil soils, which have a red subsoil. They occur in the southern and western parts of the county. Much of the acreage in Appling soils is cultivated.

**Appling sandy loam, very gently sloping phase** (2 to 7 percent slopes) (AeB).—The following describes a profile of this soil:

$A_p$ 0 to 8 inches, dark-gray (10YR 4/1) sandy loam; weak, fine, granular structure; very friable; abundant roots; strongly acid; boundary clear and wavy; 6 to 12 inches thick.

$B_1$ 8 to 14 inches, strong-brown (7.5YR 5/6) sandy clay loam; moderate, medium, subangular blocky structure; friable; numerous roots; strongly acid; boundary gradual and wavy; 4 to 8 inches thick.

$B_2$ 14 to 31 inches, yellowish-red (5YR 5/8) sandy clay loam; moderate, medium, subangular blocky structure; firm; few roots; strongly acid; boundary gradual and wavy; 10 to 20 inches thick.

$B_3$ 31 to 37 inches, reddish-yellow (5YR 6/6) sandy clay loam with many, fine, faint red (2.5YR 4/8) mottles; firm; few roots; strongly acid; boundary clear and wavy; 4 to 12 inches thick.

C 37 to 48 inches, pale-brown weathered rock with many, coarse, prominent, red (2.5YR 4/8) mottles; massive (structureless).

The color of the subsoil ranges from yellow to yellowish red. The thickness of the solum ranges from 24 to 40 inches. Included with this soil are some gravelly areas.

Appling sandy loam, very gently sloping phase, is low in organic matter and moderate in natural fertility. Infiltration is moderately rapid, and permeability is moderate in the subsoil. The plow layer is easy to work.

Although there is a slight hazard of erosion, this soil is suited to cultivated crops. Additions of organic matter will greatly increase the growth of crops. Practically all of this soil has been cultivated at one time. About 70 percent is now cultivated, 20 percent is in trees, and 5 percent is in pature. The rest is idle. Capability unit IIe–2.

**Appling sandy loam, gently sloping phase** (7 to 10 percent slopes) (AeC).—This soil is on steeper slopes than Appling sandy loam, very gently sloping phase. It has more rapid runoff and less rapid infiltration than the very gently sloping phase. Although this soil has not been seriously eroded, it is susceptible to erosion.

This soil is moderately well suited to crops. It can be used regularly for crops if it is managed intensively and the crops are grown in a suitable cropping system. About 63 percent of this soil is in trees, 20 percent is in crops, and 7 percent is in pasture. The rest is idle. Capability unit IIIe–2.

**Appling sandy loam, sloping phase** (10 to 14 percent slopes) (AeD).—This soil is steeper than Appling sandy loam, very gently sloping phase, and has a shallower surface soil. It has greater runoff than the very gently sloping phase and less infiltration and available moisture-holding capacity.

This soil is best suited to pasture or forest. If it is very carefully managed, it can be used occasionally for crops. About 75 percent of this soil is in trees, 15 percent is in crops, and 10 percent is in pasture. Capability unit IVe–1.

**Appling sandy loam, moderately steep phase** (14 to 25 percent slopes) (AeE).—This soil is steeper than Appling sandy loam, very gently sloping phase, and it has more runoff, less infiltration, and a greater hazard of erosion. Its use for pasture or forest is moderately limited. About 73 percent of this soil is in forest, 25 percent is cultivated, and the rest is in pasture. Capability unit VIe–2.

**Appling sandy clay loam, eroded very gently sloping phase** (2 to 7 percent slopes) (AdB2).—This soil has lost 30 to 60 percent of its original surface soil through erosion, and in places deep gullies have formed. The 5- or 6-inch plow layer is a mixture of the surface soil and the former subsoil. This soil absorbs less water than Appling sandy loam, very gently sloping phase, and is more susceptible to erosion.

Because it is eroded and has little moisture available to plants, this soil is severely limited in its use for cultivated crops. Crops, however, can be grown in suitable cropping systems under intensive management. About 71 percent of this soil is in crops, 14 percent is in trees, and 5 percent is in pasture. The rest is idle. Capability unit IIIe–2.

**Appling sandy clay loam, eroded gently sloping phase** (7 to 10 percent slopes) (AdC2).—This soil has a finer textured surface soil than Appling sandy loam, very gently sloping phase. It is steeper than the very gently sloping sandy loam and more severely eroded. Half of its original surface soil is gone, and in places a few deep gullies have formed.

This soil ought to be kept in permanent vegetation, but, if it is carefully managed, it can be used occasionally for cultivated crops. About 63 percent of this soil is in crops, 19 percent is in trees, and 9 percent is in pasture. The rest is idle. Capability unit IVe–1.

**Appling sandy clay loam, severely eroded gently sloping phase** (7 to 10 percent slopes) (AdC3).—This soil has a finer textured plow layer than Appling sandy loam, gently sloping phase. Most of the original surface soil has been lost through erosion, and the plow layer is almost entirely in the subsoil. Many places have a few deep gullies and numerous shallow ones.

This soil is not suited to cultivated crops. Its use for pasture or woodland is moderately limited. About 42 percent of this soil is in trees, 36 percent is in crops, and 2 percent is in pasture. The rest is idle. Capability unit VIe–2.

**Appling sandy clay loam, eroded sloping phase** (10 to 14 percent slopes) (AdD2).—This soil has a finer textured surface soil than Appling sandy loam, very gently sloping phase. Its plow layer is a mixture of the original surface soil and the subsoil. It is steeper than the very gently sloping sandy loam and more severely eroded. A few gullies have formed in places.

This soil has a small total acreage. Because of its steep slopes, it is not suited to cultivated crops. It is moderately limited in its use for pasture or forest. Nevertheless, about 44 percent of this soil is in crops, 39 percent is in trees, and 12 percent is in pasture. The rest is idle. Capability unit IVe–1.

**Appling sandy clay loam, severely eroded sloping phase** (10 to 14 percent slopes) (AdD3).—This soil has a finer textured surface soil than Appling sandy loam, gently sloping phase. It is steeper than the gently sloping sandy loam and is more severely eroded. Most of its original surface layer has been lost through erosion. Many shallow gullies and a few deep ones have formed in places.

This soil has a small total acreage. It is not suited to cultivated crops, and its use for pasture or forest is moderately limited. About 46 percent of this soil is in trees, 29 percent is in crops, and 6 percent is in pasture. The rest is idle. Capability unit VIe–2.

**Appling sandy clay loam, severely eroded moderately steep phase** (14 to 25 percent slopes) (AdE3).—This soil is steeper than Appling sandy loam, very gently sloping phase, and more severely eroded. Most of its original surface soil is gone, and many shallow gullies and a few deep ones have formed.

This soil is not suited to cultivated crops, and its use for pasture or forest is severely limited. About 81 percent of this soil is in trees, 12 percent is in pasture, and 3 percent is in crops. The rest is idle. Capability unit VIIe–1.

### *Buncombe series*

In this series are deep, somewhat excessively drained, light-colored soils that are widely scattered on bottom lands. These soils are on sandy deposits next to streams. They are associated with the Congaree and Chewacla soils. Throughout the profile, they are coarser textured than the Chewacla soils. Their native vegetation was mainly oak and hickory but included some poplar, sycamore, and willow.

Only one Buncombe soil is mapped in Forsyth County. It has a small total acreage and a narrow range in suitability.

**Buncombe loamy fine sand** (0 to 2 percent slopes) (Ba).—The following describes a profile of this soil:

$A_p$ 0 to 9 inches, light-brown (7.5YR 6/4) loamy fine sand; loose; strongly acid; boundary gradual and smooth; 8 to 12 inches thick.

$C_{11}$ 9 to 25 inches, light-gray (10YR 7/2) or very pale brown (10YR 7/3) loamy fine sand; loose; strongly acid; 12 to 18 inches thick.

$C_{12}$ 25 inches +, yellowish-gray to gray sand and fine sand that contain some gravel.

The thickness of the sandy deposits over gravel ranges from 30 to 40 inches. Included with this soil are areas that range from fine sand to loamy sand in texture. Also included are small, poorly drained areas.

Buncombe loamy fine sand has slow runoff but very rapid internal drainage. Because of its coarse texture, plant nutrients and fertilizer are readily leached and fertility is difficult to maintain. This soil contains a small amount of organic matter and has a low available moisture-holding capacity (fig. 5)

*Figure 5.*—**Buncombe loamy fine sand is low in fertility and available moisture-holding capacity**

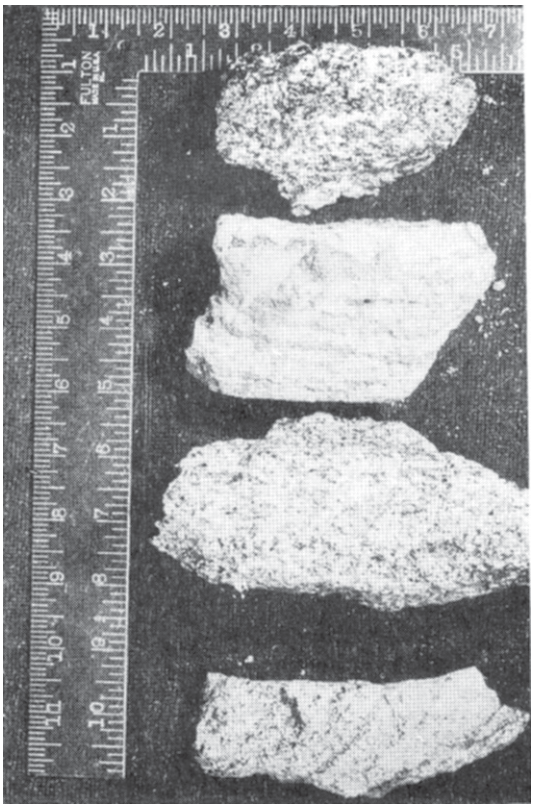

*Figure 6.*—**Rock from which Cecil soils are derived.**

Although this soil has a narrow range in suitability, it can be cultivated if fertilizer is added frequently. It is well suited to truck crops. If the soil is heavily fertilized, it is well suited to coastal bermudagrass that is used for transplanting. About 51 percent of this soil is in trees, 30 percent is in crops, and 2 percent is in pasture. The rest is idle. Capability unit IVs–1.

### *Cecil series*

In this series are deep, well-drained soils that have developed from weathered gneiss, granite, and schist (fig. 6). The native vegetation was mainly hardwoods and pine. These soils have a dark reddish-gray to dark-gray, loamy surface soil over a reddish-brown to red, clay loam subsoil. Their slopes range from about 2 to more than 30 percent. They are strongly acid. Although these soils generally contain a large amount of potassium, only a small amount of this potassium is available to plants.

Cecil soils are associated with Appling, Madison, Lloyd, Louisa, and Louisburg soils. They have a redder subsoil than the Appling soils and a less micaceous subsoil than the Madison. Their surface soil is not so brown as that of the Madison or the Lloyd soils. Cecil soils are deeper than the Louisburg soils and have more distinct horizons.

These soils are extensive and are distributed throughout the county. Cecil soils are well suited to many kinds of crops.

**Cecil sandy loam, very gently sloping phase** (2 to 7 percent slopes) (CcB).—The following describes a profile of this soil:

$A_p$ 0 to 10 inches, dark reddish-gray (5YR 4/2) sandy loam; weak, fine, granular structure; very friable; abundant roots; strongly acid; boundary gradual and wavy; 6 to 10 inches thick.

$A_3$ 10 to 16 inches, reddish-brown (5YR 5/4) fine sandy loam; weak, fine, granular structure; very friable; numerous roots; strongly acid; boundary gradual and wavy; 6 to 10 inches thick.

$B_1$ 16 to 18 inches, reddish-brown (2.5YR 4/4) sandy clay loam; moderate, fine, subangular blocky structure; friable; numerous roots; strongly acid; boundary gradual and wavy; 2 to 4 inches thick.

$B_2$ 18 to 40 inches, red (2.5YR 5/6) clay loam; moderate, medium, subangular blocky structure; firm; few roots; strongly acid; boundary gradual and wavy; 20 to 24 inches thick.

$B_3$ 40 to 48 inches, weak-red (10R 4/4) clay loam; weak, medium, subangular blocky structure; firm; some fine mica flakes; strongly acid; boundary diffuse and wavy; 6 to 12 inches thick.

C 48 to 60 inches, reddish-brown weathered rock; friable; abundant mica; strongly acid.

The color of the A horizon ranges from dark reddish gray to gray. The thickness of the solum ranges from 30 to 50 inches. In Forsyth County, a thin mantle of transported material has been deposited on the surface. Indications are that the A horizon is 3 to 6 inches thicker than is generally found in Cecil soils. Near Suwanee Mountain this soil is more sandy throughout than in the profile heretofore described.

Cecil sandy loam, very gently sloping phase, contains a small amount of organic matter. Its available moisture-holding capacity is moderate. Permeability is moderately rapid in the surface soil and moderate in the subsoil.

This soil is easily worked and produces good yields of many cultivated crops (fig. 7). A slight erosion hazard moderately limits its use. About 61 percent of this soil is in crops, 33 percent is in trees, and 4 percent is in pasture. The rest is idle. Capability unit IIe–1.

**Cecil sandy loam, eroded very gently sloping phase** (2 to 7 percent slopes) (CcB2).—This eroded soil has greater runoff than Cecil sandy loam, very gently sloping phase, and less available water-holding capacity, natural fertility, and organic matter. Its plow layer is a mixture of the surface soil and the subsoil.

***Figure 7.*—Cecil sandy loam, very gently sloping phase, in the background, and Starr loam, in the foreground, are examples of some of the better cropland.**

This soil is suited to a wide variety of crops. Cultivated crops can be grown at regular intervals if they are grown under intensive management in a suitable cropping system. A suitable system keeps two-thirds of the soil in close-growing crops and does not allow row crops in the same place more than 2 successive years. About 77 percent of this soil is in crops, 11 percent is in trees, and 4 percent is in pasture. The rest is idle. Capability unit IIIe–1.

**Cecil sandy loam, gently sloping phase** (7 to 10 percent slopes) (CcC).—Because this soil has steeper slopes than Cecil sandy loam, very gently sloping phase, it has greater runoff and less infiltration. Consequently, it has a greater hazard of erosion.

This soil is suited to cultivated crops, but it needs intensive management to control erosion. Much of the acreage that was once cultivated is now in forest. About 79 percent of the total acreage is in trees, 15 percent is in crops, and 4 percent is in pasture. The rest is idle. Capability unit IIIe–1.

**Cecil sandy loam, eroded gently sloping phase** (7 to 10 percent slopes) (CcC2).—This eroded soil has steeper slopes than Cecil sandy loam, very gently sloping phase, and, therefore, greater runoff and less infiltration. Its plow layer is a mixture of the original surface soil and the subsoil. The content of organic matter is low.

The use of this soil is limited by its slope and by erosion. Cultivated crops should be grown only occasionally, but good yields of hay or pasture can be obtained continuously under careful management. About 75 percent of this soil is in crops, 16 percent is in trees, and 5 percent is in pasture. The rest is idle. Capability unit IVe–1.

**Cecil sandy loam, sloping phase** (10 to 15 percent slopes) (CcD).—This soil has steeper slopes and greater runoff than Cecil sandy loam, very gently sloping phase. It also has a thinner solum.

Although this soil can be used for cultivated crops, it should be kept in pasture or forest. Under good management, good pasture and hay can be grown. About 94 percent of this soil is in trees, 4 percent is in crops, and 2 percent is in pasture or is idle. Capability unit IVe–1.

**Cecil sandy loam, eroded sloping phase** (10 to 15 percent slopes) (CcD2).—This eroded soil has steeper slopes and greater runoff than Cecil sandy loam, gently sloping phase, and it contains less organic matter. It is suited to pasture or forest. It produces good yields of hay or pasture if erosion is controlled. About 47 percent of this soil is in crops, 37 percent is in trees, and 8 percent is in pasture. The rest is idle. Capability unit IVe–1.

**Cecil clay loam, severely eroded very gently sloping phase** (2 to 7 percent slopes) (CaB3).—This soil is finer textured than Cecil sandy loam, very gently sloping phase, and is more severely eroded. Consequently, it has greater runoff and less infiltration. It has a thinner solum than the sandy loam and contains less organic matter. It is not so easily worked. Some of the many gullies that have formed are too deep to be easily crossed with farm machinery.

This soil has a narrow range in use and ought to be kept in pasture or forest most of the time. Generally, it will deteriorate further if it is cultivated. About 45 percent is in crops, 24 percent is in trees, and 3 per-

cent is in pasture. The rest is idle. Capability unit IVe–1.

**Cecil clay loam, severely eroded gently sloping phase** (7 to 10 percent slopes) (CaC3).—This soil is finer textured than Cecil sandy loam, very gently sloping phase, and is more severely eroded. It has more rapid runoff and less infiltration. Many gullies have formed that are too deep to be crossed with farm machinery.

This soil is better suited to hay, pasture, and forest than it is to cultivated crops. If erosion is controlled and deep-rooted pasture plants are established, fair yields of hay and pasture can be obtained. About 39 percent of this soil is in crops, 33 percent is in trees, and 6 percent is in pasture. The rest is idle. Capability unit VIe–2.

**Cecil clay loam, severely eroded sloping phase** (7 to 14 percent slopes) (CaD3).—This soil is finer textured and steeper than Cecil sandy loam, gently sloping phase, and more severely eroded. Many gullies have formed that are too deep to be crossed with farm machinery.

This soil is best suited to pasture or forest, but pasture plants are difficult to establish without causing further erosion. If the pasture plants are established and the soil is well managed, yields of pasture and hay are fair. About 56 percent of this soil is in trees, 21 percent is in crops, and 6 percent is in pasture. The rest is idle. Capability unit VIIe–1.

**Cecil clay loam, severely eroded moderately steep phase** (14 to 25 percent slopes) (CaE3).—This soil has a finer textured, shallower surface soil than Cecil sandy loam, very gently sloping phase. Its subsoil is mixed with the surface soil. Because this soil is steeper and more severely eroded than the very gently sloping sandy loam, it has greater runoff and less infiltration. Some of the many gullies that have formed are too deep to be crossed with farm machinery.

Because of the steep slope and severe erosion, this soil ought to be kept in trees. It can be used for grazing in a limited way. About 77 percent of this soil is in trees, 8 percent is in crops, and 3 percent is in pasture. The rest is idle. Capability unit VIIe–1.

**Cecil clay loam, severely eroded steep phase** (25+ percent slopes) (CaF3).—This soil has a finer textured surface soil and steeper slopes than Cecil sandy loam, very gently sloping phase. It is more severely eroded than the sandy loam and has greater runoff and less infiltration. All of the original surface soil has been removed through erosion. Many gullies have formed.

This soil is not suited to cultivated crops. About 95 percent is in trees, 1 percent is in pasture, and the rest is idle. Capability unit VIIe–1.

**Cecil fine sandy loam, eroded very gently sloping phase** (3 to 10 percent slopes) (CbB2).—This soil is finer textured than Cecil sandy loam, very gently sloping phase, and is more severely eroded. Its plow layer is a mixture of the original surface soil and the subsoil. It has greater runoff and less infiltration than the sandy loam and contains less organic matter.

This soil has a wide range in use and can be used regularly for crops if they are grown under careful management in a good cropping system. About 45 percent of this soil is in crops, 39 percent is in trees, and 4 percent is in pasture. The rest is idle. Capability unit IIIe–1.

**Cecil fine sandy loam, gently sloping phase** (10 to 15 percent slopes) (CbC).—This soil is finer textured and steeper than Cecil sandy loam, very gently sloping phase. Consequently, it has greater runoff and less infiltration. It can be used occasionally for cultivated crops, but its best use is for forest or pasture. About 87 percent of this soil is in trees, 11 percent is in crops, and the rest is idle. Capability unit IVe–1.

**Cecil fine sandy loam, eroded gently sloping phase** (10 to 15 percent slopes) (CbC2).—This soil is finer textured and steeper than Cecil sandy loam, very gently sloping phase, and more severely eroded. Its plow layer is a mixture of the original surface soil and the subsoil. It has greater runoff and less infiltration than the sandy loam and contains less organic matter.

If carefully managed, this soil can be used occasionally for cultivated crops, but its best use is for forest or pasture. About 58 percent of this soil is in crops, 41 percent is in trees, and the rest is idle. Capability unit IVe–1.

**Cecil fine sandy loam, sloping phase** (15 to 20 percent slopes) (CbD).—This soil has finer texture and steeper slopes than Cecil sandy loam, very gently sloping phase, and greater runoff and less infiltration. Its use for crops is severely limited, but it can be cultivated occasionally. Its best use is for perennial vegetation. About 94 percent is in trees, 2 percent is cultivated, and the rest is idle. Capability unit IVe–1.

**Cecil fine sandy loam, eroded sloping phase** (15 to 20 percent slopes) (CbD2).—This soil has finer texture than Cecil sandy loam, very gently sloping phase, and a thinner solum. Its plow layer is a mixture of the original surface soil and the subsoil. This soil is steeper than the sandy loam, and it has greater runoff and less infiltration.

This soil is not suited to cultivated crops, and it ought to be used for pasture or forest. Nevertheless, about 35 percent is in crops. About 44 percent is in trees, 2 percent is in pasture, and the rest is idle. Capability unit VIe–2.

**Cecil fine sandy loam, moderately steep phase** (20 to 30 percent slopes) (CbE).—This soil has finer texture than Cecil sandy loam, very gently sloping phase, and a thinner surface soil and solum. Because of the steep slopes, runoff is greater on this soil than it is on the very gently sloping sandy loam. Large, moderately steep areas of sandy loam are included in this mapping unit.

This soil is not suited to cultivated crops. About 98 percent is in trees, and the rest is idle. Capability unit VIe–2.

**Cecil fine sandy loam, eroded moderately steep phase** (20 to 30 percent slopes) (CbE2).—This soil is finer textured and steeper than Cecil sandy loam, very gently sloping phase, and more severely eroded. It has greater runoff than the sandy loam and less infiltration. It contains a smaller amount of organic matter. Included with this soil are areas of the eroded phases of Cecil sandy loam.

This soil is best suited to pasture or forest. About 85 percent is in trees, 7 percent is in crops, and 2 percent is in pasture. The rest is idle. Capability unit VIIe–1.

**Cecil fine sandy loam, steep phase** (30+ percent slopes) (CbF).—This soil has a finer texture and steeper slopes than Cecil sandy loam, very gently sloping phase, and greater runoff. It has a thinner surface soil than the very gently sloping sandy loam and a shallower solum.

This soil has only a narrow range in suitability. It is not suited to cultivated crops and should be used only for pasture or forest. All of this soil is in forest. Capability unit VIe–1.

### *Chewacla series*

In this series are moderately well drained to somewhat poorly drained, nearly level to gently sloping soils on flood plains. These soils are forming in sediments that were washed from the Cecil, Appling, Lloyd, and other soils. They are strongly acid. The native trees were mixed oaks and gum. The surface soil is brown silt loam that is mottled below depths of about 14 to 25 inches.

Chewacla soils are associated with Congaree, Wehadkee, and Buncombe soils. They are not so well drained as the Congaree soils, which are not mottled. They are better drained than the poorly drained Wehadkee soils.

Only one Chewacla soil is mapped in Forsyth County. This soil lies along the streams. It has a small total acreage, much of which has been cleared and cultivated.

**Chewacla silt loam** (0 to 2 percent slopes) (Cd).—The following describes a profile of this soil:

$A_{1p}$ 0 to 7 inches, brown (7.5YR 5/4) silt loam; medium, fine, crumb structure; friable; abundant roots; contains some mica flakes; strongly acid; boundary diffuse and smooth; 6 to 14 inches thick.

$A_{12}$ 7 to 14 inches, brown (7.5YR 5/4) silt loam; weak, medium and fine, subangular blocky structure; friable; few roots; many fine mica flakes; strongly acid; boundary diffuse and smooth; 6 to 10 inches thick.

AC 14 to 25 inches, dark-brown (7.5YR 4/4) silt loam with common, fine, distinct reddish-brown (5YR 5/4) mottles; weak, medium and fine, subangular blocky structure; friable; few roots; many fine mica flakes; strongly acid; boundary clear and smooth; 8 to 10 inches thick.

C 25 to 30 inches, very dark grayish-brown (10YR 3/2) silt loam with common, fine, distinct brown (7.5YR 5/4) mottles; very weak, medium and fine, subangular blocky structure; friable; contains a few mica flakes; strongly acid.

This soil is mottled below depths ranging from 10 to 20 inches. In some places, the texture of the subsoil is sandy loam. Small mica flakes are common throughout the profile.

Chewacla silt loam is likely to be flooded at times. It has slow runoff and slow internal drainage. Its available moisture-holding capacity is moderate to high.

This soil is well suited to pasture and, if adequately drained, produces excellent yields of corn, oats, grain sorghum, soybeans, and truck crops. It responds well to management and is improved by fertilizer and liming. About 47 percent of this soil is in trees, 28 percent is in crops, and 6 percent is in pasture. The rest is idle. Capability unit IIIw–2.

### *Congaree series*

In this series are deep, nearly level, well-drained soils on flood plains along the large streams of the county. These soils are developing in material that was washed from the Cecil, Appling, Lloyd, and other upland soils. The native trees on the Congaree soils were oak, hickory, gum, and beech. These soils have a brown silt loam surface soil and faint, yellowish-brown mottles at depths below 28 inches.

Congaree soils are associated with the Chewacla, Wehadkee, and Buncombe soils. They are the well-drained members of the catena that includes the moderately well drained to somewhat poorly drained Chewacla soils and the poorly drained Wehadkee soils.

Congaree soils have a small total acreage, most of which has been cleared and used for crops or pasture. These soils are among the most productive in the county and are suited to intensive use.

**Congaree silt loam** (0 to 2 percent slopes) (Cf).—The following describes a profile of this soil:

$A_p$ 0 to 7 inches, brown (10YR 5/3) silt loam; very weak, medium, granular structure: friable; abundant roots; many fine mica flakes; strongly acid; boundary clear and smooth; 6 to 8 inches thick.

$A_b$ 7 to 21 inches, very dark gray (10YR 3/1) silt loam; weak, medium and fine, granular structure; friable; abundant roots; contains fine mica flakes; strongly acid; diffuse boundary; 11 to 22 inches thick.

$AC_b$ 21 to 28 inches, brown to dark-brown (10YR 5/3 to 4/3) silt loam; weak, medium and fine, subangular blocky structure; very friable; few roots; contains fine mica flakes; strongly acid; diffuse boundary; 5 to 12 inches thick.

$C_b$ 28 to 35 inches, brown (10YR 5/3) silt loam with few, fine, faint yellowish-brown mottles; weak, medium and fine, subangular blocky structure; friable; contains fine mica flakes; strongly acid.

The color of the surface soil ranges from light grayish brown to brown. In some places, lenses of sandy material occur in the profile. The texture of the subsoil varies from place to place. Below a depth of about 20 inches, faint mottling may be present.

Congaree silt loam is moderately permeable and has adequate moisture that is available to plants. It is easy to work and has only a slight erosion hazard, but some areas need to be protected against the runoff from upland soils.

This soil is suited to a wide variety of crops. It is excellent for grain sorghum and can be used year after year for corn that is interplanted with peas, winter legumes, or suitable clovers. About 47 percent of this soil is in trees, 28 percent is in crops, and 6 percent is in pasture. The rest is idle. Capability unit IIw–2.

**Congaree fine sandy loam** (0 to 2 percent slopes) (Ce).—This soil has coarser texture than Congaree silt loam and less available moisture-holding capacity. Its subsoil is slightly more permeable than that of the silt loam. Although this soil is less fertile than the silt loam, it is more easily worked.

This soil has about the same uses as Congaree silt loam and needs about the same management. It is suited to a wider range of crops, however, and is better suited to truck crops. About 73 percent of this soil is in crops, 13 percent is in trees, and 4 percent is in pasture. The rest is idle. Capability unit IIw–2.

### *Edgemont series*

This series consists of moderately deep, strongly acid, well-drained residual soils that developed from highly weathered quartzite on the sloping and moderately steep parts of the higher ridges. The native trees are oak, hickory, and, in the higher places, chestnut and chinquapin. These soils have a dark-brown, stony sandy loam surface soil and a yellowish-brown, sandy clay loam subsoil. The highly weathered quartzite occurs at a depth of about 42 inches. These soils are associated with the Habersham soils, which have a strong-brown subsoil.

Edgemont soils are in small areas in the Cecil-Habersham soil association on three ridges in the central part of the county. They are infertile, generally stony, and are not suited to cultivated crops.

**Edgemont stony sandy loam, moderately steep phase** (10 to 15 percent slopes) (EaE).—The following describes a profile of this soil:

$A_0$ 1 to 0 inch, dark-gray (10YR 4/1) deciduous mull.
$A_1$ 0 to 4 inches, dark-brown (7.5YR 4/4) stony sandy loam; weak, medium, granular structure; very friable; numerous roots; much gravel and stone; strongly acid; boundary gradual and wavy; 3 to 6 inches thick.
$A_2$ 4 to 11 inches, brown (7.5YR 5/4) sandy loam; weak, medium and fine, granular structure; friable; much gravel and stone; strongly acid; boundary gradual and wavy; 5 to 9 inches thick.
$B_2$ 11 to 29 inches, yellowish-brown (10YR 5/4) sandy clay loam; moderate, medium and coarse, subangular blocky structure; firm; much gravel and stone; strongly acid; boundary gradual and wavy; 13 to 19 inches thick.
$B_3$ 29 to 42 inches, yellowish-brown (10YR 5/8) sandy clay loam; moderate, medium and fine, subangular blocky structure; firm; contains quartz fragments and stones; strongly acid; boundary gradual and wavy; 9 to 15 inches thick.
C 42 to 50 inches, yellowish-brown (10YR 5/6) friable, weathered quartzite containing some lenses of clay.

The color of the subsoil ranges from yellowish brown to strong brown. The depth to weathered rock ranges from 28 to 42 inches.

Edgemont stony sandy loam, moderately steep phase, contains little organic matter and is low in natural fertility. It is rapidly permeable and has low available moisture-holding capacity. It is too stony for cultivation and is used only for forest. Capability unit VIIe–2.

**Edgemont stony sandy loam, eroded very gently sloping phase** (2 to 6 percent slopes) (EaB2).—This soil is deeper than the other phases of Edgemont stony sandy loam, and it has less runoff. Although it is not so steep as the moderately steep phase, it is more severely eroded.

Most areas of this soil are so stony that cultivation is difficult. A few of the small, less stony areas are used for cultivated crops, but the best use is for pasture or forest. About 57 percent of this soil is in crops, 38 percent is in trees, and 2 percent is in pasture. The rest is idle. Capability unit VIIe–2.

**Edgemont stony sandy loam, gently sloping phase** (6 to 10 percent slopes) (EaC).—This soil has more gentle slopes and less runoff than Edgemont stony sandy loam, moderately steep phase, but it has a slightly shallower profile. Because the soil is stony, the best use is for pasture or forest. About 92 percent of this soil is in trees, and 8 percent is in crops. Capability unit VIIe–2.

**Edgemont stony sandy loam, eroded sloping phase** (2 to 10 percent slopes (EaD2).—This soil has a shallower surface soil and entire solum than Edgemont stony sandy loam, moderately steep phase. Although it is not so steep as the moderately steep phase, it has greater runoff and less infiltration. A few deep gullies have formed in places.

Because of its slope, stoniness, and erosion, this soil is suited only to pasture or forest. Nevertheless, about 52 percent is in crops. About 24 percent is in trees, 4 percent is in pasture, and the rest is idle. Capability unit VIIe–2.

**Edgemont stony sandy loam, eroded moderately steep phase** (10 to 15 percent slopes) (EaE2).—This soil has lost most of its original surface soil through erosion. It is shallower than Edgemont stony sandy loam, moderately steep phase, and has greater runoff and less infiltration. A few deep gullies have formed in places.

Because of its stoniness, steep slopes, and erosion, this soil is best suited to forest. About 90 percent of this soil is in trees, 6 percent is in crops, and the rest is idle. Capability unit VIIe–2.

**Edgemont stony sandy loam, steep phase** (15+ percent slopes) (EaF).—This soil is steeper and shallower than Edgemont stony sandy loam, moderately steep phase, and has greater runoff. Because of its stoniness and steep slopes, it is best suited to forest. All of this soil is in forest. Capability unit VIIe–2.

### *Gullied land*

This land consists of areas that have been so severely eroded that many deep gullies have formed. The undisturbed soil remains only in small areas between the gullies.

**Gullied land, acid materials** (Ga).—This land consists of areas that were areas of Cecil, Appling, Madison, Edgemont, Wickham, and Louisburg soils. The original profile has been destroyed by erosion except in a few places between gullies. This land is not suited to cultivated crops. Its use for forest and pasture is severely limited. There are 12,200 acres of this land in the county. About 66 percent is in trees, 6 percent is in crops, and 4 percent is in pasture. The rest is idle. Capability unit VIIe–1.

**Gullied land, Lloyd materials** (Gb).—This land consists of areas that were areas of Lloyd soils. The parent material is basic and has a content of mineral matter different from that of Gullied land, acid materials. In slope and degree of erosion, however, this land is similar to Gullied land, acid material.

This land is not suited to cultivated crops. Its use for pasture or forest is severely limited. Of a total area of 437 acres, 64 percent is in trees, 3 percent is in crops, and the rest is idle. Capability unit VIIe–1.

### *Habersham series*

This series consists of shallow, well-drained to excessively drained soils that developed in place on weathered quartzite (fig. 8). These soils are on ridges that extend across the county from northeast to southwest. Their slopes range from 2 to more than 15 percent. The native trees are mixed hardwoods. These soils have a very dark gray, stony fine sandy loam surface soil that is underlain by a strong-brown, sandy clay loam subsoil. The depth to bedrock varies from 20 to 36 inches. These soils are generally stony, low in organic matter, and strongly acid.

Habersham soils are associated with the Edgemont soils. They are browner than the Edgemont and have less well developed horizons. Their total acreage is small, and they are not important agriculturally.

**Habersham stony fine sandy loam, moderately steep phase** (15+ percent slopes) (HaE).—The following describes a profile of this soil:

$A_1$ 0 to 8 inches, very dark gray (10YR 3/1) stony fine sandy loam; weak, fine, granular structure; very friable; about 50 percent of the soil mass is gravel and stone; strongly acid; boundary gradual and wavy; 2 to 12 inches thick.

*Figure 8.*—**Parent rock of Habersham soils.**

$A_2$ 8 to 11 inches, brown (10YR 5/3) coarse sandy loam; weak, coarse, granular structure; very friable; more than 50 percent of the soil mass is gravel; strongly acid; boundary gradual and broken; 0 to 12 inches.

B 11 to 17 inches, strong-brown (7.5YR 5/6) friable sandy clay loam; weak, medium, subangular blocky structure; firm; strongly acid.

C 17 to 36 inches, strong-brown (7.5YR 5/6) weathered quartzite rock.

In places the profile is slightly deeper than the one described and slightly less stony. The B horizon is thin and discontinuous and ranges from strong brown to yellowish red. The bedrock may be pink, yellow, or gray.

The soil is leached and low in fertility. It is rapidly permeable, low in available moisture-holding capacity, and low in organic matter.

This soil is not suited to cultivated crops. It is severely limited in its use for pasture or forest. About 97 percent of this soil is in trees, 2 percent is in crops, and the rest is idle. Capability unit VIIe–2.

**Habersham stony fine sandy loam, eroded very gently sloping phase** (2 to 6 percent slopes) (HaB2).—This soil is not so steep as Habersham stony fine sandy loam, moderately steep phase, but it is more severely eroded. Most of its original surface soil has been lost through erosion.

This soil is not suited to cultivated crops, and it is severely limited in its use for pasture or forest. Nevertheless, about 50 percent of this soil is in crops, 38 percent is in trees, and the rest is idle. Capability unit VIIe–2.

**Habersham stony fine sandy loam, sloping phase** (6 to 10 percent slopes) (HaD).—This soil is less steep and slightly deeper than Habersham stony fine sandy loam, moderately steep phase, and it has slightly less runoff. It is too stony to be used for crops (fig. 9), and ought to be kept in pasture or forest. About 89 percent of this soil is in trees, 10 percent is in crops, and the rest is idle. Capability unit VIIe–2.

**Habersham stony fine sandy loam, severely eroded sloping phase** (6 to 15 percent slopes) (HaD3).—This soil is not so steep as Habersham stony fine sandy loam, moderately steep phase, but it is more severely eroded. Most of the original surface soil has been lost through erosion. Runoff is greater than on the moderately steep phases, and infiltration is less.

This soil is not suited to cultivated crops, and it is severely limited in its use for pasture or forest. Nevertheless, about 45 percent is in crops and 44 percent is in trees. About 3 percent is in pasture, and the rest is idle. Capability unit VIIe–2.

**Habersham stony fine sandy loam, severely eroded moderately steep phase** (15+ percent slopes) (HaE3).—This soil is more severely eroded than Habersham stony fine sandy loam, moderately steep phase. All of the original surface soil has been lost through erosion, and a few deep gullies have formed. Runoff is greater than on the uneroded moderately steep phase and infiltration is less.

This soil is not suited to cultivated crops, and its use for pasture or forest is severely limited. Nevertheless, about 32 percent of this soil is in crops, 44 percent is in trees, and 2 percent is in pasture. About 28 percent is idle. Capability unit VIIe–2.

### *Hiwassee series*

In this series are deep, strongly acid, well-drained soils that lie in small areas on terraces along some of the larger streams in the county. These soils have developed in alluvium that was deposited when streams were at higher elevations. This alluvium was washed mainly from Lloyd soil and soils similar to the Lloyd. The native trees were mainly hardwoods and pine. These soils range in slope from 2 to 15 percent. Their surface soil is dark reddish-brown fine sandy loam. Their subsoil is red silty clay loam, which is underlain at a depth of 44 inches by sand and gravel.

*Figure 9.*—**Habersham stony fine sandy loam, sloping phase, has sufficient stones to make use of machinery impractical.**

Hiwassee soils are associated with the Masada, Wickham, and Altavista soils. They are higher above streams than the Wickham and Altavista soils. Their red subsoil differs from that of the Masada soils, which is strong brown or yellowish red.

These soils are very productive. They have a small total acreage, most of which has been cleared and is used for cultivated crops.

**Hiwassee fine sandy loam, eroded gently sloping phase** (2 to 6 percent slopes) (HbC2).—The following describes a profile of this soil:

$A_p$ 0 to 10 inches, dark reddish-brown (5YR 3/4) fine sandy loam; weak, medium, granular structure; very friable; abundant roots; strongly acid; boundary gradual and wavy; 8 to 12 inches thick.

$B_1$ 10 to 14 inches, reddish-brown (2.5YR 4/4) clay loam; weak, coarse, subangular blocky structure; friable; strongly acid; boundary diffuse and wavy; 2 to 6 inches thick.

$B_{21}$ 14 to 26 inches, red (2.5YR 4/6) silty clay loam; weak, coarse and medium, subangular blocky structure; firm; strongly acid; boundary diffuse and irregular; 10 to 15 inches thick.

$B_{22}$ 26 to 44 inches, red (2.5YR 4/6) clay loam; weak, coarse and medium, angular blocky structure; friable; strongly acid; boundary diffuse and irregular; 12 to 24 inches thick.

D 44 to 80 inches +, yellowish-red (5YR 5/6) layers of compact sand containing many pebbles and a few rounded quartz and granite cobbles.

The surface layer varies from place to place in color, texture, and depth, depending on the degree of erosion. The depth to the D horizon ranges from 25 to 72 inches. Gravel may be present in any of the horizons.

This soil is well drained and only moderately eroded. Its permeability and available moisture-holding capacity are moderate. Runoff is medium and infiltration is moderate.

This soil is suited to all crops commonly grown in the county. It responds well to good management. If a suitable cropping system is used, this soil can be cultivated regularly. About 80 percent of the acreage is cultivated, 11 percent is idle, and 9 percent is wooded. Capability unit IIIe–1.

**Hiwassee fine sandy clay loam, eroded sloping phase** (6 to 15 percent slopes) (HcD2).—This soil is steeper than Hiwassee fine sandy loam, eroded gently sloping phase, and more severely eroded. It has greater runoff and less infiltration. Because of erosion, its surface soil is thinner than that of the fine sandy loam and contains less organic matter.

This soil is best suited to pasture or woods. About 43 percent is wooded, 34 percent is cultivated, and 23 percent is idle. Capability unit IVe–1.

### *Lloyd series*

This series consists of deep, strongly acid, well-drained soils that were derived from hornblende gneiss and schist. These soils are scattered throughout the county where dikes and intrusions of basic rock occur. Their positions in the landscape are not uniform. Slopes range from 2 to 25 percent. The native trees were hardwoods. These soils have a weak-red loam or clay loam surface soil and a red, firm, clay subsoil. Weathered rock is at a depth of about 68 inches.

These soils are associated with the Cecil and Madison soils. They are finer textured and redder than the Cecil soils.

Lloyd soils are suited to many kinds of plants and are very productive. More than half of the acreage is now cultivated.

**Lloyd loam, very gently sloping phase** (2 to 6 percent slopes) (LbB).—The following describes a profile of this soil:

$A_p$ 0 to 7 inches, weak-red (10R 4/3) loam; weak, medium, granular structure; friable; abundant roots; medium acid; boundary clear and wavy; 6 to 10 inches thick.

$B_1$ 7 to 15 inches, weak-red (10R 4/4) clay loam; weak, medium and fine, subangular blocky structure; friable; numerous roots; medium acid; boundary gradual and wavy; 6 to 10 inches thick.

$B_2$ 15 to 59 inches, red (10R 4/6) clay; medium, fine, angular blocky structure; firm; few roots; strongly acid; boundary diffuse and wavy; 30 to 50 inches thick.

$B_3$ 59 to 68 inches, red (10R 4/6) clay loam; medium, fine, subangular blocky structure; firm; few roots; strongly acid; boundary gradual and wavy; 6 to 20 inches thick.

C 68 to 78 inches +, red (10R 4/6) decomposed and disintegrated rock that crushes under moderate pressure to a very friable loam; strongly acid; variable thickness.

The color of the B horizon ranges from red to yellowish red. The thickness of the solum over bedrock ranges from 3 to 8 feet.

Lloyd loam, very gently sloping phase, has medium runoff and internal drainage. Its available moisture-holding capacity and permeability are moderate.

This soil responds well to good management. It is easily worked and can be used intensively. It is well suited to cultivated crops and to hay, pasture, fruit orchards, and forest. About 80 percent of this soil is in crops, 17 percent is in trees, and 1 percent is in pasture. The rest is idle. Capability unit IIe–1.

**Lloyd loam, eroded very gently sloping phase** (2 to 6 percent slopes) (LbB2).—This soil differs from Lloyd loam, very gently sloping phase, in having greater runoff, less infiltration, and, therefore, more erosion. It also has less natural fertility, organic matter, and available moisture-holding capacity. The original surface soil and the subsoil have been mixed, and, in a few places, shallow gullies have formed.

This soil is suited to a wide variety of crops. It responds to good management. Under careful management, it can be used regularly for crops if they are grown in a suitable cropping system. About 70 percent of this soil is in crops, 19 percent is in trees, and 3 percent is in pasture. The rest is idle. Capability unit IIIe–1.

**Lloyd loam, eroded gently sloping phase** (6 to 10 percent slopes) (LbC2).—This soil has steeper slopes than Lloyd loam, eroded very gently sloping phase, and slightly more runoff. It is suited to a wide variety of crops and responds well to good management. About 70 percent of this soil is in crops, 15 percent is in trees, and 3 percent is in pasture. The rest is idle. Capability unit IIIe–1.

**Lloyd loam, eroded sloping phase** (10 to 14 percent slopes) (LbD2).—This eroded soil is steeper than Lloyd loam, very gently sloping phase. It has greater runoff and less infiltration than the very gently sloping phase and less available moisture-holding capacity. The plow layer is a mixture of the original surface soil and the subsoil, and a few gullies have formed.

This soil is best suited to hay, pasture, or trees. If it is carefully managed, it can be cultivated occasionally.

About 44 percent of this soil is cultivated, 42 percent is wooded, and 6 percent is in pasture. The rest is idle. Capability unit IVe–1.

**Lloyd loam, moderately steep phase** (14 to 25 percent slopes) (LbE).—This soil is steeper and shallower than Lloyd loam, very gently sloping phase. It has greater runoff than the very gently sloping phase and less infiltration. Although this soil is suited to both pasture plants and trees, most of it is now in trees. Included with this soil are a few areas that are stony and gravelly. Capability unit VIe–2.

**Lloyd loam, eroded moderately steep phase** (14 to 25 percent slopes) (LbE2).—This eroded soil is steeper than Lloyd loam, very gently sloping phase. It is less fertile and contains less organic matter. It has greater runoff and less infiltration than the very gently sloping phase and less available moisture-holding capacity. A few gullies have formed in places.

This soil is suited to hay, pasture, or trees. About 57 percent is wooded, 31 percent is cultivated, and 3 percent is in pasture. The rest is idle. Capability unit VIe–2.

**Lloyd clay loam, severely eroded very gently sloping phase** (2 to 7 percent slopes) (LaB3).—This severely eroded soil is finer textured and shallower than Lloyd loam, very gently sloping phase. It has greater runoff than the loam and less available moisture-holding capacity. Most of the original surface soil has been lost, and a few deep gullies have formed.

This soil ought to be kept in perennial vegetation. It is well suited to hay, pasture, and trees. Under careful management, cultivated crops can be grown occasionally. About 45 percent of this soil is cultivated, 36 percent is in trees, and 6 percent is in pasture. The rest is idle. Capability unit IVe–1.

**Lloyd clay loam, severely eroded gently sloping phase** (7 to 10 percent slopes) (LaC3).—This soil is somewhat steeper than Lloyd clay loam, severely eroded very gently sloping phase. It has, therefore, greater runoff and a shallower solum than the severely eroded very gently sloping phase.

This soil is best suited to pasture, trees, or other perennial vegetation. Nevertheless, about 45 percent is cultivated. About 36 percent is in forest, 6 percent is in pasture, and 13 percent is idle. Capability unit IVe–1.

**Lloyd clay loam, severely eroded sloping phase** (10 to 14 percent slopes) (LaD3).—This severely eroded soil is steeper and finer textured than Lloyd loam, very gently sloping phase. Runoff is greater than on the loam, and infiltration and available moisture-holding capacity are less. Nearly all of the original surface soil has been lost through erosion, and a few deep gullies have formed.

This soil is well suited to hay, pasture, and trees. It is not suited to cultivated crops, but about 26 percent of the acreage is cultivated. About 46 percent is in forest, 5 percent is in pasture, and 23 percent is idle. Capability unit VIe–2.

**Lloyd clay loam, severely eroded moderately steep phase** (14 to 25 percent slopes) (LaE3).—This severely eroded soil is much steeper than Lloyd loam, very gently sloping phase, and somewhat finer textured. It has greater runoff and less infiltration than the very gently sloping loam and less available moisture-holding capacity. Nearly all of the original surface soil has been lost through erosion, and a few deep gullies have formed.

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This soil needs to be protected by deep-rooted pasture plants and sod grasses. These are difficult to establish, and they grow only fairly well. This soil is not suited to cultivated crops, but about 15 percent of its acreage is cultivated. About 57 percent is in trees, 5 percent is in pasture, and 23 percent is idle. Capability unit VIIe–1.

### *Louisa series*

In this series are shallow, well-drained soils that developed from weathered mica schist, mica gneiss, and quartz mica gneiss on gentle to steep slopes along drainageways. These soils have a red, fine sandy loam or fine sandy clay loam surface soil and a red, micaceous, silty clay loam subsoil. The weathered mica schist is at a depth of about 16 inches. The native trees were hardwoods.

Louisa soils are associated with the Madison, Cecil, and Lloyd soils. They differ from the Madison soils in being shallower and more micaceous and in having a B horizon that is not so distinct as that of the Madison.

These soils are scattered throughout the county in small areas. Much of the acreage is in trees.

**Louisa fine sandy loam, moderately steep phase** (14 to 25 percent slopes) (LcE).—This soil is slightly eroded. A description of its profile follows:

$A_p$ 0 to 3 inches, red (2.5YR 4/6) fine sandy loam; weak, medium, granular structure; very friable; abundant roots; strongly acid; boundary clear and smooth; 3 to 8 inches thick.

$B_1$ 3 to 8 inches, red (10R 4/6) silty clay loam; moderate, fine, angular blocky structure; friable; numerous roots; strongly acid; boundary gradual and wavy; 3 to 8 inches thick.

$B_3$ 8 to 16 inches, red (10R 4/6) silty clay loam; moderate, medium, subangular blocky structure; friable; few large roots; contains much fine mica; strongly acid; boundary gradual and irregular.

C 16 to 50 inches, red (10R 5/6) weathered mica schist; a few large roots extend to a depth of 6 feet.

Included with this soil are some local gravelly areas.

Louisa fine sandy loam, moderately steep phase, has moderate to rapid permeability and moderately low available moisture-holding capacity. It is susceptible to further erosion.

This soil ought to be kept in vegetation all of the time. Probably it should be kept in trees, but moderately good pasture can be obtained under good management. About 95 percent of this soil is in trees, and 2 percent is in pasture. The rest is idle. Capability unit VIe–3.

**Louisa fine sandy loam, eroded gently sloping phase** (2 to 10 percent slopes) (LcC2).—This gently sloping soil has somewhat excessive runoff, which is greater than that on Louisa fine sandy loam, moderately steep phase. Workability and productivity are only fair.

This soil is not suited to cultivation, but 42 percent of the acreage is cultivated. The soil is best suited to trees, and 36 percent is woodland. Under proper management, pasture produces moderate yields. About 4 percent of this soil is in pasture, and 18 percent is idle. Capability unit IVe–4.

**Louisa fine sandy loam, eroded sloping phase** (10 to 14 percent slopes) (LcD2).—This soil is slightly steeper than Louisa fine sandy loam, eroded gently sloping phase, but it is similar to the eroded gently sloping phase in other respects. It is suitable for about the same uses and

needs about the same management. About 42 percent of this soil is cultivated, 36 percent is in trees, and 22 percent is idle. Capability unit IVe–4.

**Louisa fine sandy loam, steep phase** (25+ percent slopes) (LcF).—This soil is steeper than Louisa fine sandy loam, moderately steep phase, and has greater runoff and less infiltration. It is best suited to trees, and about 98 percent of the acreage is in trees. About 1 percent is cultivated, and 1 percent is idle. Capability unit VIIe–2.

**Louisa fine sandy clay loam, severely eroded moderately steep phase** (14 to 25 percent slopes) (LdE3).—This soil is finer textured and shallower than Louisa fine sandy loam, moderately steep phase. It has greater runoff than the fine sandy loam and is more severely eroded. Most of the original surface soil has been lost through erosion, and a few deep gullies have formed.

This soil is not suited to cultivated crops, but about 19 percent of the acreage is cultivated. The soil is severely limited in its use for pasture or trees. Woodland should not be cleared. About 54 percent of this soil is in trees, 7 percent is in pasture, and 20 percent is idle. Capability unit VIIe–2.

### *Louisburg series*

In this series are shallow, well-drained to excessively drained upland soils on slopes that range from 2 to more than 25 percent. These soils developed in place from weathered granite and gneiss. The native trees were hardwoods. These soils have a sandy loam surface soil that is directly underlain by the weathered granite and gneiss at a depth of about 10 inches. The upper surface soil is dark gray to dark reddish gray, and the lower surface soil is reddish brown.

Louisburg soils are associated with the Cecil, Appling, Louisa, Edgemont, and Habersham soils. They are shallower than the Cecil and the Appling soils and have less strongly developed horizons. Their parent material is not highly micaceous like that of the Louisa soils.

These soils have a small total acreage in the county. Almost all of it is in trees.

**Louisburg sandy loam, eroded gently sloping phase** (2 to 14 percent slopes) (LeC2).—The following describes a profile of this soil:

$A_p$ 0 to 6 inches, dark-gray (10YR 4/1) to dark reddish-gray (5YR 4/2) light sandy loam; weak, fine, granular structure; loose; strongly acid; boundary gradual and wavy; 4 to 6 inches thick.

$A_2$ 6 to 10 inches, dark reddish-gray (5YR 4/2) to weak red (2.5YR 4/2) to reddish-brown (2.5YR 5/4) sandy loam; weak, fine, granular structure; loose; strongly acid; boundary diffuse and irregular; 1 to 6 inches thick.

C 10 to 30 inches, pale-brown (10YR 6/3) to reddish-brown (2.5YR 4/4) massive, friable, weathered rock.

In some places, the parent rock is not so deeply weathered as that described and many outcrops occur. The thickness of the A horizon varies from 6 to 20 inches.

This soil is well drained to somewhat excessively drained. It has medium to rapid external drainage and rapid internal drainage. The available moisture-holding capacity is low to moderately low. Workability is poor to good.

This soil is severely limited in its use for cropland, and it is suited to only a narrow range of crops. Its response to management is poor to fair. Nevertheless, about 31 percent of this soil is in crops. About 43 percent is in trees, and the rest is idle. Capability unit IVe–4.

**Louisburg sandy loam, moderately steep phase** (14 to 25 percent slopes) (LeE)—This soil is steeper than Louisburg sandy loam, eroded gently sloping phase, but it is less severely eroded. It is generally shallower than the gently sloping phase and has more rock outcrops.

This soil is not suited to cultivated crops. It is moderately limited in its use for pasture or woodland, and wooded areas should not be cleared. About 95 percent of this soil is in trees, 2 percent is in crops, and the rest is idle. Capability unit VIe–3.

**Louisburg sandy loam, steep phase** (25+ percent slopes) (LeF).—This soil is much steeper than Louisburg sandy loam, eroded gently sloping phase, but is less severely eroded. It has more rock outcrops. This soil is not suited to cultivated crops, and its use for grazing or forestry is severely limited. Wooded areas should not be cleared. About 98 percent of this soil is in trees, and the rest is idle. Capability unit VIIe–2.

### *Madison series*

In this series are moderately deep, well-drained, strongly acid soils on slopes that range from 2 to 25 percent. These soils have a surface soil of reddish-brown fine sandy loam or fine sandy clay loam. Their subsoil is red clay loam that is underlain at a depth of 37 inches by weathered quartz mica schist or mica schist. The native trees were mixed hardwoods.

Madison soils are associated with the Cecil, Appling, Louisa, and Lloyd soils. They are similar to the Cecil soils in color of the subsoil but are browner in the surface soil. They have a thinner solum than the Cecil and are more micaceous. They are similar to the Louisa soils in color and in content of mica, but they have a well-developed B horizon that the Louisa soils lack.

The Madison soils occur throughout the county. Their forested areas are now in mixed hardwoods and pine. A large part of the more gently sloping areas has been cleared and is used for cultivated crops.

**Madison fine sandy loam, eroded very gently sloping phase** (2 to 7 percent slopes) (MbB2).—This soil has lost 25 to 75 percent of its original surface soil through erosion, and the plow layer is a mixture of the surface soil and the subsoil. A few deep gullies have formed. The following describes a profile of this soil:

$A_p$ 0 to 5 inches, reddish-brown (5YR 5/4) fine sandy loam; weak, medium, granular structure; very friable; many roots; strongly acid; boundary clear and wavy; 2 to 5 inches thick.

$A_2$ 5 to 12 inches, red (2.5YR 5/6) fine sandy loam; weak, medium, granular structure; friable; many roots; strongly acid; boundary gradual and wavy; 4 to 10 inches thick.

$B_2$ 12 to 30 inches, red (10R 5/6) clay loam; moderately fine, subangular blocky structure; firm; few roots; strongly acid; boundary gradual and wavy; 15 to 20 inches thick.

$B_3$ 30 to 37 inches, red (2.5YR 4/6) clay loam; moderate, fine and medium, subangular blocky structure; firm; few roots; strongly acid; boundary abrupt and wavy; 5 to 20 inches thick.

C 37 to 60 inches, weak-red (10R 5/4) decomposed quartz mica schist.

Included with this soil are areas of sandy loam. Also included are small gravelly areas that are indicated on the soil map by gravel symbols.

Madison fine sandy loam, eroded very gently sloping phase, is moderately deep and well drained. It has medium runoff, moderate permeability, and moderate available moisture-holding capacity. It is easily worked and responds well to good management.

This soil is suited to a wide variety of crops. Under intensive management, cultivated crops can be grown regularly in a suitable cropping system that keeps close-growing crops on two-thirds of the acreage. About 82 percent of this soil is in crops, 8 percent in trees, and 6 percent in pasture. The rest is idle. Capability unit IIIe–1.

**Madison fine sandy loam, eroded gently sloping phase** (7 to 10 percent slopes) (MbC2).—This soil is steeper than Madison fine sandy loam, eroded very gently sloping phase and, therefore, has greater runoff, less infiltration, and a greater hazard of erosion. Included with this soil are some wooded areas that are not eroded (fig. 10).

***Figure 10.*—Uneroded gently sloping areas of Madison fine sandy loam. The trees on this soil help to control runoff and erosion.**

This soil is severely limited in its use for cultivated crops, but, under intensive management, crops can be grown regularly in a suitable cropping system. About 74 percent of this soil is in crops, 14 percent is in trees, and 4 percent is in pasture. The rest is idle. Capability unit IIIe–1.

**Madison fine sandy loam, eroded sloping phase** (10 to 14 percent slopes) (MbD2).—This eroded soil is steeper and shallower than Madison fine sandy loam, eroded very gently sloping phase, and has, therefore, greater runoff and less infiltration.

Although this soil is not well suited to cultivated crops, about 46 percent of the acreage is cultivated. This soil is moderately limited in its use for grazing or forestry but, if moderate protective measures are taken, good yields of pasture and hay can be obtained. About 34 percent of this soil is in pasture, 15 percent is in trees, and the rest is idle. Capability unit IVe–1.

**Madison fine sandy loam, moderately steep phase** (14 to 25 percent slopes) (MbE).—This soil is steeper and shallower than Madison fine sandy loam, eroded very gently sloping phase, and has greater runoff. The shallowness and excessive runoff reduces its capacity to hold water that plants can use. This soil is susceptible to severe erosion if it is cleared, but most of it has been left in trees.

This soil is not suited to cultivation and is moderately limited in its use for grazing or forestry. About 96 percent of the acreage is in trees, and the rest is in crops, in pasture, or is idle. Capability unit VIe–2.

**Madison fine sandy loam, eroded moderately steep phase** (14 to 25 percent slopes) (MbE2).—This soil is shallower and steeper than Madison fine sandy loam, eroded very gently sloping phase, and has a much greater hazard of erosion. It has greater runoff and less infiltration than the eroded very gently sloping phase and less available moisture-holding capacity.

This soil is severely limited in its use for pasture or forest. If erosion is controlled, reasonably good stands of pasture plants can be established. This soil is not suited to cultivated crops, but about 28 percent is cultivated. About 63 percent is in trees, 4 percent is in pasture, and the rest is idle. Capability unit VIe–2.

**Madison fine sandy clay loam, severely eroded very gently sloping phase** (2 to 7 percent slopes) (MaB3).—This severely eroded soil is finer textured than Madison fine sandy loam, eroded very gently sloping phase, and has greater runoff. It contains a smaller amount of organic matter than the fine sandy loam and has less natural fertility. This soil has lost most of its surface soil through erosion. Its plow layer is almost entirely in the subsoil, and many gullies have formed. Some of the gullies are too deep to be crossed with farm machinery. Workability and productivity are only poor to fair.

This soil is best suited to pasture or forest. It is a fairly good soil, and, under very careful management, can be used occasionally for crops. About 33 percent is now in crops, 10 percent is in trees, and 57 percent is idle. Capability unit IVe–1.

**Madison fine sandy clay loam, severely eroded gently sloping phase** (7 to 10 percent slopes) (MaC3).—This soil is steeper than Madison fine sandy clay loam, severely eroded very gently sloping phase, and, therefore, has greater runoff and a greater erosion hazard. It is not suited to cultivated crops, but about 37 percent is cultivated. If protective measures are used, fair yields of hay and pasture can be produced. About 34 percent is in trees, 4 percent is in pasture, and the rest is idle. Capability unit VIe–2.

**Madison fine sandy clay loam, severely eroded sloping phase** (10 to 14 percent slopes) (MaD3).—This eroded soil is steeper, shallower, and finer textured than Madison fine sandy loam, very gently sloping phase, and it has greater runoff. Severe erosion has lowered the natural fertility of this soil and reduced the content of organic matter. The plow layer is mostly in the subsoil, and a few deep gullies have formed.

This soil is severely limited in its use for pasture or forest. Although it is not suited to cultivated crops, about 29 percent is cultivated. About 44 percent is in trees, 7 percent is in pasture, and the rest is idle. Capability unit VIe–2.

**Madison fine sandy clay loam, severely eroded moderately steep phase** (14 to 25 percent slopes) (MaE3).—This soil has greater runoff than Madison fine sandy clay loam, severely eroded sloping phase, and is more severely eroded. In places deep gullies have formed.

This soil is severely limited in its use for grazing or forestry. Forestry is the best use because the trees prevent further erosion. Although this soil is not suited to cultivated crops, about 9 percent is cultivated. About 72 percent is in trees, 4 percent is in pasture, and the rest is idle. Capability unit VIIe–1.

### *Masada series*

In this series are deep, moderately well drained, strongly acid soils that developed in old alluvium that is now high above the flood plain. This alluvium was washed from soils derived from quartzite, gneiss, and granite. Masada soils are along the larger streams and have slopes of 2 to 10 percent. They have a grayish-brown fine sandy loam surface soil and a yellowish-red silty clay subsoil. The subsoil is mottled below depths of 24 to 30 inches.

These soils are associated with the Hiwassee, Altavista, and Wickham soils. Masada soils occur in positions similar to those of the Hiwassee soils. In color they differ from the Hiwassee soils, which have a dark reddish-brown surface soil and a red subsoil. They are higher above the streams and better drained than the Altavista soils.

The Masada soils have a small total acreage, most of which is cleared and cultivated. These soils are well suited to cultivated crops.

**Masada fine sandy loam, very gently sloping phase** (2 to 7 percent slopes) (McB).—The following describes a profile of this soil:

$A_p$ 0 to 6 inches, grayish-brown (10YR 5/2) fine sandy loam; very weak, coarse, granular structure; very friable; abundant roots; strongly acid; boundary abrupt and wavy; 4 to 8 inches thick.

$B_1$ 6 to 10 inches, yellowish-red (5YR 5/8) silty clay loam; moderate, fine, subangular blocky structure; friable; numerous roots; strongly acid; boundary gradual and wavy; 2 to 6 inches thick.

$B_2$ 10 to 23 inches, yellowish-red (5YR 5/6) silty clay; moderate, medium and fine, angular blocky structure; friable; few roots; strongly acid; boundary gradual and wavy; 10 to 18 inches thick.

$B_3$ 23 to 28 inches, brownish-yellow (10YR 6/8) silty clay loam with distinct, medium, common, red (2.5YR 5/8) mottles; strong medium angular blocky structure; firm; many pebbles; strongly acid; boundary clear and wavy; 3 to 10 inches thick.

C 28 to 40 inches, white (5Y 8/1) sandy clay loam with many prominent, pale-yellow (2.5Y 8/4) and red (2.5YR 4/8) mottles; firm; strongly acid; thickness is variable.

The combined thickness of the A and B horizons ranges from 20 to more than 40 inches. The B horizon ranges from yellowish red to yellowish brown. In some places the $B_3$ horizon is very thin, and in some places it is absent. It contains a varying amount of sandstone and quartzite gravel. Included with this soil are areas that range from sandy loam to silt loam.

Masada fine sandy loam, very gently sloping phase, has medium to rapid runoff and medium to slow internal drainage. Permeability is moderate to moderately slow. This soil has a moderate capacity to hold moisture that plants can use. It is easy to work and produces good yields. Its response to management is fair to good.

This soil is well suited to cultivated crops. It can be safely cultivated by using only a few special practices. Row crops can be grown in a cropping system that keeps half the acreage in close-growing crops and does not use two successive tilled crops in the same place. About 75 percent of this soil is in crops, 12 percent is in trees, and the rest is idle. Capability unit IIe–2.

**Masada fine sandy loam, eroded gently sloping phase** (7 to 10 percent slopes) (McC2).—This eroded soil has greater runoff and less infiltration than Masada fine sandy loam, very gently sloping phase, and is more difficult to work.

The use of this soil is severely limited by erosion and the hazard of further erosion. Row crops, however, can be grown under intensive management if two-thirds of the acreage is kept in close-growing crops and if two successive row crops are not grown in the same place. About 50 percent of this soil is in crops, 25 percent is in trees, 15 percent is in pasture, and the rest is idle. Capability unit IIIe–1.

### *Seneca series*

In this series are strongly acid, well-drained soils that have very weakly developed horizons. These soils lie along the smaller streams or in small depressions and have a gradient of 0 to 2 percent. They consist of local alluvium that was washed from the Cecil, Appling, Louisburg, Habersham, and Madison soils. The alluvium, 12 to 32 inches thick, is dark grayish-brown, brown, gray, or pale brown very friable fine sandy loam.

Seneca soils are associated with the Starr soils, which are slightly darker colored and finer textured than the Seneca.

Only one Seneca soil is mapped in Forsyth County. It has a small total acreage and is well suited to cultivated crops.

**Seneca fine sandy loam** (0 to 2 percent slopes) (Sa).—The following describes a profile of this soil:

$A_p$ 0 to 12 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, granular structure; very friable; strongly acid; boundary gradual and wavy; 8 to 14 inches thick.

$A_c$ 12 to 32 inches, gray (10YR 5/1), pale-brown (10YR 6/3), or brown (10YR 5/3) fine sandy loam; very weak, fine, granular structure; very friable; abundant roots; strongly acid; boundary gradual and smooth; 12 to 32 inches thick.

D 32 to 40 inches, texture of layer extremely variable.

This alluvial soil varies from 12 inches to several feet in depth above the D horizon. It grades from dark grayish brown almost to the weak red of Starr loam. Its subsoil ranges from loamy sand to sandy clay loam.

This soil has slow runoff, medium to rapid internal drainage, and moderately rapid permeability. Its available moisture-holding capacity is moderate. It is easy to work and is productive. The hazard of erosion is slight.

This soil is well suited to a wide variety of cultivated crops. It responds very well to management. About 67 percent of the acreage is in crops, 14 percent is in trees, and 7 percent is in pasture. The rest is idle. Capability unit I–1.

### *Severely gullied land*

This land consists of soils that have been so severely eroded that their profile has been destroyed and large, deep gullies have formed.

**Severely gullied land** (Sb).—This land is not suited to crops or pasture. Its use for trees is severely limited. About 59 percent of the acreage is in trees, 11 percent is in pasture, and 1 percent is in crops. The rest is idle. Capability unit VIIe–1.

### *Starr series*

In this series are strongly acid, well-drained soils that occur along the smaller streams and in small depressions. These soils have developed in alluvium that was washed from the Cecil, Madison, Lloyd, and similar soils. They have a surface soil of weak-red loam and a subsoil of dusky-red or weak-red clay loam. The subsoil is underlain by residual material at a depth of about 38 inches.

These soils are associated with the Seneca soils. They are darker colored and finer textured than the Seneca soils.

Only one Starr soil is mapped in Forsyth County. It has a small total acreage. This soil is suited to cultivated crops and can be used intensively.

**Starr loam** (0 to 2 percent slopes) (Sc).—The following describes a profile of this soil:

$A_p$ 0 to 4 inches, weak-red (10R 4/3) loam; very weak, fine, granular structure; very friable; abundant fine roots; strongly acid; boundary gradual and smooth; 3 to 8 inches thick.

$B_{21}$ 4 to 13 inches, dusky-red (10R 3/3) clay loam; weak, fine, crumb structure; friable; many roots; strongly acid; boundary gradual and smooth; 6 to 30 inches thick.

$B_{22}$ 13 to 32 inches, weak-red (10R 4/3) clay loam; weak, medium and fine, subangular blocky structure; friable; strongly acid; boundary gradual and smooth; 0 to 12 inches thick.

$D_1$ 32 to 38 inches, weak-red (10R 4/4) sandy loam; weak, medium and coarse, subangular blocky structure; very friable; strongly acid; boundary gradual and smooth; 4 to 12 inches thick.

$D_2$ 38 to 40 inches, residual material.

The alluvial material that makes up this soil ranges from shallow to very deep. One or several textural layers may occur. This mapping unit includes areas that have a silt loam to clay loam surface soil.

Starr loam has slow external drainage and medium internal drainage. It holds an adequate amount of moisture for the growth of plants, and its erosion hazard is slight. It is easy to work and produces good yields.

This soil is suited to a wide variety of crops. It responds very well to management. About 55 percent of the acreage is in crops, 21 percent is in trees, and 11 percent is in pasture. The rest is idle. Capability unit I–1.

### *Thurmont and Braddock series*

Thurmont and Braddock soils were mapped together in Forsyth County because they occur in such intricate patterns that it was not practical to map them separately. They are deep, well-drained soils that have developed in old colluvium on foot slopes. These foot slopes were occupied by Habersham and Edgemont soils before they were covered.

The Thurmont soils have an olive fine sandy loam surface soil and a yellowish-brown sandy clay loam subsoil. The Braddock soils have a dark reddish-brown fine sandy loam surface soil and a red clay loam to silty clay loam subsoil.

Thurmont and Braddock soils have residual material below depths of 2 to 8 feet. The native trees were hardwoods.

These soils are associated with the Edgemont, Habersham, Cecil, and Appling soils. In color and texture, the Thurmont soils are similar to Appling, and the Braddock soils are similar to Cecil.

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The Thurmont and Braddock soils have a small total acreage, most of which is cleared and cultivated.

**Thurmont and Braddock fine sandy loams, very gently sloping phases** (2 to 7 percent slopes) (TaB).—The following describes a profile of Thurmont fine sandy loam, very gently sloping phase:

$A_o$ 2 to 0 inch, black (5Y 2/1) deciduous mull.

$A_1$ 0 to 4 inches, olive (5Y 5/3) fine sandy loam; weak, coarse, granular structure; very friable; abundant roots; strongly acid; boundary clear and wavy; 3 to 6 inches thick.

$A_3$ 4 to 7 inches, light yellowish-brown (10YR 6/4) sandy loam; weak, coarse, granular structure; friable; many roots; strongly acid; boundary clear and wavy; 3 to 7 inches thick.

$B_2$ 7 to 32 inches, yellowish-brown (10YR 5/4) sandy clay loam; moderate, medium, subangular blocky structure; friable; few roots; strongly acid; boundary gradual and wavy; 20 to 30 inches thick.

$B_3$ 32 to 44 inches, light yellowish-brown (10YR 6/4) sandy clay loam; moderate, coarse, angular blocky structure; friable; few roots; strongly acid; boundary gradual and wavy; 6 to 17 inches thick.

C 44 to 60 inches, reddish-brown (5YR 5/4) sandy clay loam with many coarse light yellowish-brown (10YR 6/4) mottles; friable; 10 to 20 inches thick and underlain by residual material.

The subsoil ranges from yellowish brown almost to the red of the Braddock subsoil. Included in this mapping unit are some gravelly and stony areas.

The following describes a profile of Braddock fine sandy loam, very gently sloping phase:

$A_1$ 0 to 5 inches, dark reddish-brown (5YR 3/3) fine sandy loam; weak, medium, granular structure; very friable; abundant roots; strongly acid; 3 to 6 inches thick.

$A_3$ 5 to 11 inches, reddish-brown (2.5YR 4/4) loam; moderate, medium, granular structure; friable; many roots; strongly acid; boundary gradual and wavy; 3 to 8 inches thick.

$B_1$ 11 to 24 inches, red (10R 4/6) clay loam; moderate, medium and fine, subangular blocky structure; friable; many roots; some quartzite fragments and dark stains, strongly acid; boundary diffuse and wavy; 8 to 15 inches thick.

$B_2$ 24 to 39 inches, red (2.5YR 4/6) silty clay loam; moderate, medium, angular blocky structure; friable; few roots; some quartzite fragments and few dark stains and concretions; strongly acid; boundary diffuse and wavy; 10 to 18 inches thick.

$B_3$ 39 to 72 inches, red (2.5YR 5/8) sandy clay loam; moderate, coarse, angular blocky structure; friable; strongly acid; boundary diffuse and wavy; 10 to 40 inches thick.

C 72 to 92 inches, red (2.5YR 5/8) sandy clay loam; friable; 6 inches to 2 feet thick and underlain by residual material.

The combined thickness of the A, B, and C horizons over the residual material ranges from 2 to 8 feet. This soil grades from its typical color almost to that of the Thurmont soils.

Thurmont and Braddock fine sandy loams, very gently sloping phases, have medium runoff and internal drainage. Permeability is moderately rapid to moderate, and available moisture-holding capacity is moderate. These soils are easy to work, and they respond well to management.

This mapping unit is suited to a wide variety of crops and can be cultivated safely if conservation practices are used. Row crops can be grown in a cropping system that keeps half the acreage in close-growing crops and does not grow two successive row crops in the same place. About 74 percent of the acreage is in crops, 15 percent is in trees, and 5 percent is in pasture. The rest is idle. Capability unit IIe–1.

**Thurmont and Braddock fine sandy loams, eroded very gently sloping phases** (2 to 7 percent slopes)

(TaB2).—These eroded soils have greater runoff and less infiltration than Thurmont and Braddock fine sandy loams, very gently sloping phases, and contain less organic matter. The plow layer is a mixture of 25 to 50 percent original surface soil and from 50 to 75 percent subsoil. In places a few deep gullies have formed.

These soils are moderately good for most crops. If intensively managed, they can be cultivated regularly in a cropping system that keeps two-thirds of the acreage in close-growing crops and does not grow two successive crops in the same place. About 73 percent of the acreage is in crops, 13 percent is in trees, and 4 percent is in pasture. The rest is idle. Capability unit IIIe–1.

**Thurmont and Braddock fine sandy loams, severely eroded sloping phases** (7 to 14 percent slopes) (TaD3).—These soils are steeper and more severely eroded than Thurmont and Braddock fine sandy loams, very gently sloping phases. They have, therefore, greater runoff, less infiltration, and less organic matter. The plow layer is a mixture of about equal amounts of original surface soil and subsoil.

These soils are best suited to perennial vegetation. They are moderately limited in their use for crops, but, under careful management that includes moderate protective measures, hay and pasture can be grown. Wooded areas should not be cleared. About 41 percent of the acreage is in crops, 35 percent is in trees, and 6 percent is in pasture. The rest is idle. Capability unit VIe–1.

### *Wehadkee series*

In this series are nearly level, poorly drained, strongly acid alluvial soils that occur along streams. These soils have a gray to light-gray silt loam plow layer. Below a depth of about 8 inches, the material is light-gray silty clay loam with yellow, gray, and brown mottles. The native vegetation was gum, water oak, and other water-tolerant trees.

These soils are associated with Congaree, Chewacla, and Buncombe soils. The Wehadkee soils are members of the same catena as the well drained Congaree and the moderately well drained to somewhat poorly drained Chewacla soils. Their gray surface soil differs from that of the Congaree and Chewacla, which is brown.

Only one Wehadkee soil is mapped in Forsyth County. Its total acreage is small, and it is not suited to cultivation.

**Wehadkee silt loam** (0 to 2 percent slopes) (Wa).—The following describes a profile of this soil:

$A_p$ 0 to 8 inches, gray (10YR 5/1) to light-gray (10YR 7/1) silt loam with common, fine, faint brown mottles; very weak, coarse, granular structure; friable when moist and slightly sticky when wet; abundant roots; strongly acid; boundary diffuse and smooth; 5 to 10 inches thick.

AC 8 to 30 inches, light-gray (10YR 7/1) silty clay loam with many, medium and coarse, prominent, yellowish, gray, and brown mottles; weak, fine, subangular blocky structure; friable to firm, sticky when wet; strongly acid; boundary is diffuse and wavy; 6 to 50 inches thick.

D 30 to 40 inches +, compact light-gray (10YR 7/1) silty clay with coarse prominent, yellow, red, and brown mottles; structureless; firm; strongly acid; may be a few inches to several feet thick over gravel or may be stratified and have sand lenses.

The AC and D horizons vary considerably in thickness. The D horizon varies in texture but is always waterlogged. Included with this soil are some areas of fine sandy loam and some areas of silty clay loam.

Wehadkee silt loam has slow runoff, slow internal drainage, and slow to moderately slow permeability. It has slight to no erosion hazard, but it is difficult to work and produces low yields.

This soil is not suited to cultivated crops. It is best suited to hay, pasture, or trees. About 82 percent of the acreage is in trees and about 16 percent is in pasture. The rest is idle. Capability unit IVw–1.

### *Wickham series*

This series consists of deep, well-drained, strongly acid soils that occur on slopes of 1 to 15 percent in small areas along the larger streams of the county. These soils have developed in sediments that were washed from Lloyd, Cecil, Madison, Appling, and Habersham soils. They have a reddish-brown fine sandy loam surface soil and a red clay loam subsoil. Residual material is below depths of 46 to 66 inches.

These soils are associated with the Altavista soils, which are moderately well drained members of the Wickham-Altavista-Roanoke catena. In color the Wickham soils differ from the Altavista soils, which are dark grayish brown in the surface soil and light olive brown in the subsoil.

Most of this soil has been cleared and is being used for crops.

**Wickham fine sandy loam, very gently sloping phase** (1 to 7 percent slopes) (WbB).—The following describes a profile of this soil:

$A_p$ 0 to 9 inches, reddish-brown (5YR 5/4) fine sandy loam; weak, medium, granular structure; very friable; strongly acid; boundary clear and wavy; 7 to 14 inches thick.

$B_1$ 9 to 17 inches, yellowish-red (5YR 4/6) sandy clay loam; weak, coarse and medium, subangular blocky structure; friable; strongly acid; boundary gradual and wavy; 6 to 12 inches thick.

$B_2$ 17 to 30 inches, red (2.5YR 4/6) clay loam; moderate, fine and medium, angular blocky structure; firm; strongly acid; boundary gradual and wavy; 10 to 30 inches thick.

$B_3$ 30 to 46 inches, red (2.5YR 4/6) sandy clay loam; weak, coarse and medium, angular blocky structure; firm; contains many quartzite pebbles; strongly acid; boundary gradual and wavy; 10 to 25 inches thick.

C 46 to 66 inches, red (2.5YR 5/6) clay loam; weak, coarse, angular blocky structure; friable; strongly acid; 3 to 20 or more inches thick and underlain by residual material.

Because the depth of the deposited material varies from place to place, the lower horizons of this soil differ in thickness. The B horizon may be as little as 18 inches and as much as 60 inches thick. A few areas have gravel on the surface and throughout the profile. Included with this soil are some areas of clay loam.

Wickham fine sandy loam, very gently sloping phase, has medium to slow runoff and medium internal drainage. Permeability is moderately rapid to moderate, and available moisture-holding capacity is moderate to moderately low. This soil is not likely to erode, and it responds well to good management.

This soil is suited to a wide variety of crops. Row crops can be grown safely in a suitable cropping system that keeps half the acreage in close-growing crops and does not grow two successive row crops in the same place. About 75 percent of this soil is in crops, 9 percent is in trees, and 2 percent is in pasture. The rest is idle. Capability unit IIe–1.

**Wickham fine sandy loam, eroded very gently sloping phase** (2 to 7 percent slopes) (WbB2).—This eroded soil has greater runoff and less infiltration than Wickham fine sandy loam, very gently sloping phase, and contains less organic matter. The plow layer is a mixture of about equal amounts of original surface soil and subsoil.

This soil is moderately well suited to crops. It can be used regularly if it is intensively managed. Row crops can be grown in a cropping system that keeps two-thirds of the acreage in close-growing crops and does not grow two successive row crops in the same place. About 80 percent of this soil is in cultivation, 10 percent is in woods, and 1 percent is in pasture. The rest is idle. Capability unit IIIe–1.

**Wickham fine sandy loam, eroded sloping phase** (7 to 15 percent slopes) (WbD2).—This eroded soil has steeper slopes than Wickham fine sandy loam, very gently sloping phase, and, therefore, has greater runoff and less infiltration. It also has a lower content of organic matter. Most of its original surface soil has been lost through erosion, and the hazard of further erosion is severe.

This soil has only a narrow range of uses. If properly managed, it produces good yields of hay or pasture. Although this soil is not suited to crops, about 25 percent of the acreage is in crops. About 49 percent is in pasture, 13 percent is in trees, and the rest is idle. Capability unit VIe–2.

### *Worsham series*

In this series are poorly drained, strongly acid soils that have developed in a thin mantle of local alluvium over residuum. These soils occur on colluvial fans at the base of slopes, in depressions, and in low areas at the heads of streams. They have a dark-gray sandy loam surface soil, about 4 inches thick. This is underlain by white sandy clay loam that is mottled with brownish yellow. White weathered rock is at a depth of about 32 inches.

These soils are associated with Cecil, Appling, Louisburg, Madison, Louisa, and Seneca soils. They occur on the same kind of positions as the Seneca soils but are more poorly drained than the Seneca.

The Worsham soils are used mostly for woodland and pasture.

**Worsham sandy loam, level phase** (0 to 2 percent slopes) (WcA).—The following describes a profile of this soil:

$A_p$ 0 to 4 inches, dark-gray (5YR 4/1) sandy loam; weak, medium, granular structure; very friable; strongly acid; boundary clear and smooth; 4 to 8 inches thick.

$B_{21}$ 4 to 21 inches, white (5Y 8/1) sandy clay loam with many, fine, prominent, brownish-yellow (10YR 6/6) mottles; moderate, medium, subangular blocky structure; friable when moist; slightly plastic when wet; strongly acid; boundary gradual and wavy; 14 to 40 inches thick.

$B_{22}$ 21 to 32 inches, light-gray (5Y 7/2) sandy clay loam with many, coarse, prominent, brownish-yellow (10YR 6/6) mottles; moderate, medium, subangular blocky structure; firm; strongly acid; boundary gradual and wavy; 6 to 20 inches thick.

D 32 inches +, white (5Y 8/1) weathered rock with common, fine, distinct, yellow (10YR 7/6) mottles; strongly acid.

Small areas of this soil have a thin covering of recently deposited material that is well drained. Included with this soil are areas of silt loam.

Worsham sandy loam, level phase, is shallow and has slow runoff, slow internal drainage, and slow permeability. This soil is difficult to work and is not productive. Its response to management is poor.

This soil is best suited to pasture or trees. It is not suited to crops. About 57 percent of the acreage is in trees, 17 percent is in pasture, and 6 percent is in crops. The rest is idle. Capability unit Vw–1.

**Worsham sandy loam, very gently sloping phase** (2 to 7 percent slopes) (WcB).—The soil is more susceptible to erosion than Worsham sandy loam, level phase, because it is steeper and has faster runoff. It is best suited to pasture or woods. This soil is not suited to cultivated crops, but about 29 percent is in crops. About 35 percent is in trees, 20 percent is in pasture, and the rest is idle. Capability unit Vw–1.

**Worsham sandy loam, eroded very gently sloping phase** (2 to 7 percent slopes) (WcB2).—This soil has steeper slopes and more rapid runoff than Worsham sandy loam, level phase, and it is more severely eroded. About 50 percent of the original surface soil has been washed away.

This soil is not suited to cultivated crops; it is better suited to pasture or forest. Although most of the acreage has been cleared, much of it is now abandoned. About 24 percent of this soil is in crops, 24 percent is in pasture, and 16 percent is in forest. The rest is idle. Capability unit VIe–2.

**Worsham sandy loam, severely eroded sloping phase** (7 to 15 percent slopes) (WcD3).—This soil is steeper than Worsham sandy loam, level phase, and more severely eroded. Most of the original surface soil has been lost through erosion, and deep gullies have formed in places.

This soil is not suited to cultivated crops, but hay or pasture can be grown under intensive management. Nevertheless, about 36 percent of the acreage is in crops and only 12 percent is in pasture. About 34 percent is in trees, and about 18 percent is idle. Capability unit VIIe–1.

## *Formation, Classification, and Morphology of Soils*

This section is divided into three parts. The first part discusses how the factors of soil formation affect the development of the soils in Forsyth County. The second part tells how the soils are classified in the higher categories and shows, by a table, the classification of the soil series in the county. The third part discusses the morphology of the soils in the county, in their respective great soil groups.

### Factors of Soil Formation

Soil is the product of the forces of weathering and development acting on parent material that has been deposited or accumulated by geologic agencies. The characteristics of the soil at any given point are determined by (1) the physical and mineralogical composition of the parent material; (2) the climate under which the soil material has accumulated and existed since accumulation; (3) the plant and animal life on and in the soil; (4) the relief, or lay of the land; and (5) the length of time the forces of development have acted upon the soil material. The relative importance of each factor of soil

development differs from place to place; in some places one is more important, in other places, another.

Climate and the biologic forces are the active factors in soil genesis. They are about uniform throughout Forsyth County. These forces act on the parent material accumulated through the weathering of rocks and slowly change this material into a mass that has genetically related horizons. Relief modifies the effects of climate and the biologic agents.

The parent material also affects the kind of profile that is formed. In some places the effect of the parent material dominates the soil-forming processes and determines most of the characteristics of the soil. In most places where the parent material is pure quartz sand, the soils have only faint horizons because factors other than parent material have had little effect on the sand. Even in quartz sand, however, distinct profiles can be formed under certain types of vegetation where the topography is low and flat and the water table is high.

Finally, time is needed for the development of soils. The degree of development depends on the length of time the forces of soil formation have been acting and on the rate at which they act. Usually, a long time is needed for the development of distinct horizons.

Climate: Forsyth County has a humid climate with long, warm summers and short, mild winters. For 5 months of the year, the average monthly rainfall is greater than 5 inches, and the rest of the year it is greater than 4 inches. The soil material remains wet much of winter and spring, and leaching is rather intense during much of the year. Between about the first of June and the middle of September, the average temperature is more than 75° F. In winter, the soil is frozen for periods of only 1 to 4 days and then to only shallow depths. Because of the mild and humid climate, plants, animals, fungi, and bacteria are very active for about 8 months of the year.

Although the general climate of the county is uniform, there are small local differences in soil climate that are the result of variations in slope and exposure. On the south- and west-facing slopes, the average daily temperature of the soil is higher than that on the north- and east-facing slopes. These differences are small, but possibly they are partly responsible for some of the local differences in soils that developed from similar parent material.

Plant and animal life: Except on the bottom land, the native vegetation was chiefly oaks, hickory, loblolly pine, and shortleaf pine. On the better drained parts of the bottom land, yellow-poplar, sweetgum, cottonwood, ash, oaks, and sycamore prevailed. On the more poorly drained parts, the trees were mainly willow, birch, blackgum, beech, and water-tolerant oaks. Not much is known about the fungi and micro-organisms except that their activity is confined mainly to the upper few inches of the soil. This is also true of the earthworms and other small animals. Rodents do not appear to have done much soil mixing. Both the climate and the biologic forces in the county have favored the development of Red-Yellow Podzolic soils in medium-textured, well-drained materials that are not susceptible to geologic or accelerated erosion.

Parent material: The parent material of the soils in Forsyth County is of two general kinds: (1) Residual material from the weathering of rocks in place, and (2) material transported by water or gravity and dropped as unconsolidated deposits of clay, silt, sand, and rock fragments. The residual materials are commonly related directly to the underlying rocks from which they were derived. The soils derived from these materials cover about 88 percent of the county. The transported materials are related to the soils or rocks from which they were washed. The soils derived from these materials cover the remaining 12 percent of the county.

The parent material formed in place consists of residuum from igneous and metamorphic rocks. These rocks include granites, gneisses, schists, and quartzite. Geologically, the rocks are old, mostly Precambrian, and partly Paleozoic.

Residual soils in the county were developed from parent material that weathered from several kinds of rocks. Following are the residual soils in the county and the kinds of rocks from which their parent material weathered: Lloyd, hornblende gneiss and schist; Louisa and Madison, mica schist and quartz mica schist; Appling and Louisburg, granites and coarse-grained gneisses; Habersham and Edgemont, quartzites; Cecil, gneiss, schist, and some granite.

Parent materials consisting of alluvium can be divided into two groups, local alluvium and general alluvium. In most places in Forsyth County, the local alluvium is material that originated from one kind of rock. Much of the general alluvium, however, consists of a mixture of material from two or more kinds of rocks. The parent rock can be specifically identified for the soils on local alluvium but not for the soils on general alluvium.

The local alluvium is old and young. The Braddock and Thurmont soils formed from old local alluvium that was derived primarily from quartzite. The Starr soils formed from young local alluvium originating mainly from hornblende gneiss. Worsham has formed from old local alluvium derived from gneiss, schist, and quartzite over residual material. Seneca has formed from young local alluvium that originated from granites, gneisses, and quartzite.

The general alluvium is also old and young. The Hiwassee, Masada, Altavista, and Wickham soils have formed form old general alluvium. The Congaree, Buncombe, Chewacla, and Wehadkee soils have formed from young general alluvium.

Relief: Forsyth County has slopes that range from 0 to more than 30 percent. Much of the acreage of the Red-Yellow Podzolic and Reddish-Brown Lateritic soils, which are the more mature soils of the uplands and stream terraces, is on slopes of 2 to 15 percent. Most of the acreage of the Lithosols is on slopes of 15 to more than 25 percent. The Alluvial soils are mainly on 0 to 2 percent slopes, but in some places along the upland drains these soils are more sloping. Parts of the slopes of the Lithosols are convex; large parts of the slopes of the Alluvial soils along the upland drains are concave.

Rocks have contributed to differences among soils through their effects on relief. The present relief probably is largely the result of differential geologic weathering and erosion that have occurred because of differences in the resistance of the various rocks to these processes. This phenomenon is well illustrated by the higher ridges that are underlain by the more resistant quartzite rock.

TIME: Two groups of young soils occur in the county. One group consists of soil materials that have not been in place long enough for climate and vegetation to cause the development of well-defined, genetically related horizons. Most of the soils of the first bottoms are of this type. The other group of young soils are on steep slopes and have had their materials removed by geologic erosion so rapidly that genetically related horizons have not developed.

Soils that have been in place for a long time and have approached equilibrium with their environment are considered mature or old. Distinct horizons have developed in these soils. The soils of Forsyth County range from young to old.

## Classification of Soils

Soils are classified at several levels. The lowest three categories—phase, type, and series—are discussed in the section, Soil Survey Methods and Definitions. The soil series are grouped in broader categories called great soil groups, which are groups of soils that have many features in common. In table 4, the great soil groups are arranged in their soil orders, and the soil series are listed in their great soil groups. Also given in table 4 are parent material, drainage, degree of profile development, and other characteristics that determine the categories into which the soils are placed.

The zonal soil order consists of soils with well-developed characteristics that reflect the influence of climate and organisms more than they reflect the influence of the other factors of soil formation. In the classification of soils, the well-developed profile that has distinct A, B, and C horizons serves as a basis for classification.

The intrazonal soil order consists of soils with evident, genetically related horizons that reflect the dominant influence of a local factor of topography, parent material, or time over the effects of climate and living organisms. Intrazonal soils occur on nearly level areas where both internal and external drainage are restricted, or where geologic erosion is very slow. They have formed from materials that have been in place for a long time, and their profile is fairly well developed. In Forsyth County the characteristics of intrazonal soils are mainly the result of the effects of the nearly level relief being greatly modified by the effects of parent material and vegetation.

The azonal soil order consists of soils that lack distinct genetically related horizons, commonly because of youth, resistant parent material, or steep topography. Alluvial soils are azonal soils that are developing from general and local alluvium. These soils are continually modified by deposits of new materials that are washed from the eroded uplands; consequently, no distinct horizons are developed. Regosols are also azonal soils. They consist of deep, unconsolidated sand deposits in which there are few or no clearly expressed characteristics.

## Morphology of Soils by Great Soil Groups

In this subsection the morphology of the soils of all the series in Forsyth County is discussed. Soil profiles that represent each series are described in the subsection, Soil Series, Types, and Phases.

### *Red-Yellow Podzolic soils*

In this group are well-developed, well-drained, acid soils that have a thin organic $A_0$ horizon and an organic-mineral $A_1$ horizon underlain by a light-colored, bleached $A_2$ horizon. The $A_2$ horizon is underlain by a red, yellowish-red, or yellow B horizon that contains more clay than the layers above. The parent material of these soils is more or less siliceous. Where the parent material is thick, the deep horizons are mottled or streaked (*4*).

These soils generally have low cation exchange capacity and low base saturation. The base saturation commonly ranges from about 20 to 30 percent. Kaolinite is the predominant clay mineral. The subsoil has moderate to high chroma and moderate to strong, subangular structure. The Cecil, Appling, Madison, and Masada soils, which combined make up about 68 percent of the county, have profiles that represent the central concept of this great soil group.

Where the $A_1$ and $A_2$ horizons have not been mixed by cultivation, these soils have a dark, thin $A_1$ horizon, 2.5 to 7 percent of which is organic matter. Organic matter makes up only 1 or 2 percent of the $A_2$ horizon. The $A_2$ horizon is well defined and has weak, granular or crumb structure. It is medium acid to strongly acid.

The $B_2$ horizon has a moderate, fine to medium, subangular or angular blocky structure. It contains considerably more clay than the $A_2$ horizon, but has about the same degree of acidity. Analyses of Red-Yellow Podzolic soils of the Piedmont in Georgia show that the cation exchange capacity of the $B_2$ layer is about 4.0 to 6.0 milliequivalents per 100 grams of soil.

The C horizon is commonly mottled or variegated with red, yellow, and some gray. It has a less well developed structure and generally a lower content of clay than the $B_2$ horizon.

Cecil and Madison soils, in Forsyth County, are good representatives of the Red-Yellow Podzolic great soil group. These soils have a thick, uniformly red $B_2$ horizon with moderate, fine to medium, subangular or angular blocky structure. They differ from each other in texture and in nature of their parent material. The Cecil soils are less micaceous in the subsoil than the Madison soils and are not so brown in the surface layer.

Appling soils are somewhat similar to the Cecil soils in characteristics of the solum, but they have a less red $B_2$ horizon than the Cecil soils and are shallower to mottled or variegated material. The colors of the Appling soils are on the 7.5YR and the 5YR Munsell color charts, but the colors of the Cecil soils are all on the 2.5YR chart.

Masada soils resemble the Appling soils but are browner in the surface layer and contain more clay in the $B_2$ horizon. They are also shallower to prominent mottling or variegated material. The Masada soils occur on stream terraces rather than on uplands.

Wickham soils are similar to the Cecil soils in drainage and degree of profile development, but they have developed on stream terraces from old alluvium rather than in place from residual material. This alluvium was washed from material that weathered from granite, gneiss, and quartzite. The $A_p$ horizon is browner in the Wickham soils than in the Cecil, and, in this county, the Wickham soils do not have a distinct $A_2$ horizon. All

TABLE 4.—*Classification of soil series of Forsyth County, Ga., in soil orders and great soil groups, some of the factors that have contributed to differences in morphology, and a generalized description of a moist profile representing each series*

ZONAL SOIL ORDER

| Great soil group and soil series | Position | Parent material | Drainage | Slope range | Degree of profile development [1] | Generalized description of moist profiles [2] |
|---|---|---|---|---|---|---|
| Red-Yellow Podzolic soils: | | | | *Percent* | | |
| Cecil | Upland | Residuum from weathered gneiss, schist, and granite. | Good | 2 to 30+ | Strong | Dark reddish-gray to dark-gray sandy loam over reddish-brown to red clay loam. |
| Appling | Upland | Residuum from weathered granite, gneiss, and coarse-grained schist. | Moderately good | 2 to 25 | Medium | Dark-gray sandy loam over a strong-brown to yellowish-red sandy clay loam with red mottles below depths of 31 to 37 inches. |
| Madison | Upland | Residuum from weathered quartz mica schist, and mica schist. | Good | 2 to 25 | Medium | Reddish-brown fine sandy loam over red clay loam; weathered rock below a depth of about 37 inches. |
| Masada | Terrace | Old general alluvium from granite, gneiss, and quartzite. | Moderately good | 2 to 10 | Medium | Grayish-brown fine sandy loam over yellowish-red silty clay with distinct mottling below a depth of about 23 inches. |
| Wickham | Terrace | Old general alluvium from granite, gneiss, and quartzite. | Good | 1 to 15 | Medium | Reddish-brown fine sandy loam over red clay loam; residual material below depths of 46 to 66 inches. |
| Edgemont | Upland | Residuum from weathered quartzite. | Good | 2 to 15+ | Medium | Dark-brown stony sandy loam over yellowish-brown sandy clay loam; highly weathered quartzite below a depth of about 42 inches. |
| Thurmont | Colluvial | Old local alluvium or colluvium from quartzite and granite. | Good | 2 to 14 | Medium | Olive fine sandy loam over yellowish-brown sandy clay loam; residual material below a depth of about 60 inches. |
| Altavista | Terrace | Old general alluvium from granite, gneiss, and schist. | Moderately good | 0 to 7 | Medium | Dark grayish-brown fine sandy loam over light olive-brown sandy clay loam with mottling below a depth of about 30 inches. |
| Braddock | Colluvial | Old local alluvium or colluvium from quartzite and granite. | Good | 2 to14 | Medium | Dark reddish-brown fine sandy loam over red clay loam to silty clay loam; residual material below depths of 2 to 8 feet. |
| Red-Yellow Podzolic soils (intergrade to Reddish-Brown Lateritic soils): | | | | | | |
| Lloyd | Upland | Residuum from weathered hornblende gneiss and schist. | Good | 1 to 25 | Medium | Weak-red loam over red, firm clay; weathered rock below a depth of about 68 inches. |
| Red-Yellow Podzolic soils (intergrade to Alluvial soils): | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Starr | Colluvial | Local alluvium or colluvium from hornblende gneiss, gneiss, and schist. | Good | 0 to 2 | Weak | Weak-red loam over dusky-red or weak-red clay loam; residual material below a depth of about 38 inches. |
| Red-Yellow Podzolic soils (intergrade to Lithosols): | | | | | | |
| Habersham | Upland | Residuum from weathered quartzite. | Good to excessive | 2 to 15+ | Weak | Very dark gray stony fine sandy loam over strong-brown sandy clay loam; weathered quartzite below a depth of about 20 inches. |
| Louisa | Upland | Residuum from weathered mica schist, mica gneiss, and quartz mica schist. | Good | 2 to 25+ | Weak | Red fine sandy loam over micaceous red silty clay loam; weathered rock below a depth of about 16 inches. |
| Reddish-Brown Lateritic soils: | | | | | | |
| Hiwassee | Terrace | Old general alluvium from hornblende gneiss and schist. | Good | 2 to 15 | Medium | Dark reddish-brown fine sandy loam over red silty clay loam; sand and gravel below a depth of about 44 inches. |
| **Intrazonal soil order** | | | | | | |
| Low-Humic Gley soils: | | | | | | |
| Worsham | Colluvial | Local alluvium or colluvium from gneiss, schist, and quartzite. | Poor | 0 to 15 | Weak | Dark-gray sandy loam over distinctly mottled white and brownish-yellow sandy clay loam; residual rock below a depth of about 32 inches. |
| **Azonal soil order** | | | | | | |
| Alluvial soils: | | | | | | |
| Buncombe | Bottom | Young general alluvium from gneiss, schist, granite, and quartzite. | Somewhat excessive | 0 to 2 | Weak | Light-brown to gray loamy fine sand over yellowish-gray sand to loamy sand; gravel below depths of 25 to 48 inches. |
| Chewacla | Bottom | Young general alluvium from gneiss, schist, granite, and quartzite. | Moderately good to somewhat poor. | 0 to 2 | Weak | Brown silt loam with distinct reddish-brown mottles below depths of 14 to 25 inches. |
| Congaree | Bottom | Young general alluvium from gneiss, schist, granite, and quartzite. | Good | 0 to 2 | Weak | Brown silt loam over dark-brown silt loam with faint yellowish-brown mottles below a depth of about 28 inches. |
| Seneca | Colluvial | Young local alluvium or colluvium from granite, gneiss, and quartzite. | Good | 0 to 2 | Weak | Dark grayish-brown, brown, gray, or pale-brown fine sandy loam, 12 to 32 inches thick. |
| Alluvial soils (intergrade to Low-Humic Gley soils): | | | | | | |
| Wehadkee | Bottom | Young general alluvium from gneiss, schist, granite, and quartzite. | Poor | 0 to 2 | Weak | Gray to light-gray silt loam over mottled gray, yellow, and brown silty clay loam. |
| Lithosols: | | | | | | |
| Louisburg | Upland | Residuum from weathered granite and gneiss. | Good to excessive | 2 to 25+ | Weak | Gray to dark reddish-gray sandy loam over weathered rock, which occurs at a depth of about 10 inches. |

[1] The degree of profile development is estimated by considering the number of important genetic horizons and the degree of contrast between them.

[2] Descriptions are for profiles that are not materially affected by accelerated erosion.

areas of Wickham soils, however, have been mixed by plowing, and it is likely that the plow layer is a mixture of former $A_1$ and $A_2$ horizons.

Edgemont soils have parent material that weathered from quartzite. They are browner throughout the profile than the Cecil soils and have a less bleached $A_2$ horizon. The Edgemont soils have a subsoil with less red and yellow than that of the Red-Yellow Podzolic soils that conform to the central concept.

Thurmont soils, which were formed from old alluvium that originated from quartzite and granite, have a thinner and less red $A_1$ horizon than that of the Cecil soils. They have a less distinct $A_2$ horizon than the Cecil soils and a browner and more friable $B_2$ horizon.

Altavista soils are moderately well drained and have formed from old alluvium on low stream terraces. These soils are less bleached in the $A_2$ horizon than the Cecil soils and are more friable and much less red in the $B_2$ horizon. They are mottled below a depth of about 30 inches, and their profile shows some effect of gleying. Altavista soils occur with the Wickham soils and in this association are in the more nearly level positions.

Braddock soils have a browner $A_1$ horizon than the Cecil soils and a thinner, more friable, finer textured $B_2$ horizon. These soils have developed in old alluvium near the Thurmont soils. In Forsyth County, their dark reddish-brown surface layer is not like that of the Braddock soils mapped in other counties, and it is not like the $A_1$ horizon of the Red-Yellow Podzolic soils that conform to the central concept. The A and B horizons of Braddock and Hiwassee soils are similar in color when they are wet, but they differ when they are dry. When dry, the $A_1$ horizon of Braddock soils is brown (7.5YR 5/4), and that of the Hiwassee soils is reddish brown (5YR 4/4); the $B_2$ horizon of Braddock soils is yellowish red (5YR 5/6), and that of the Hiwassee soils is reddish brown (5YR 5/4). The Hiwassee soils are Reddish-Brown Lateritic soils. The Braddock soils are Red-Yellow Podzolic soils but, as they occur in this county, they have some characteristics of Reddish-Brown Lateritic soils.

Lloyd soils are intergrades between the Red-Yellow Podzolic and the Reddish-Brown Lateritic great soil groups. These soils are associated with the Cecil soils but were formed from hornblende gneiss and schist, whereas the Cecil soils were formed from gneiss, granite, and schist. Lloyd soils have a browner and finer textured surface layer than the Cecil soils and generally a thicker $B_2$ horizon.

Starr loam is the only Starr soil mapped in the county. This soil has formed from local alluvium that was washed from the Lloyd soils. The profile of the Starr soil is more uniform in color than that of the Cecil soils. The Starr soil, however, has a less distinct $A_2$ horizon than the Cecil soils and a less well developed B horizon. Its profile generally is shallower than that of the Cecil soils and more variable in depth from place to place. Although the Starr soil is classed as a Red-Yellow Podzolic soil, it is considered an intergrade toward the Alluvial soils. This is because of the low contrast in color and texture between horizons.

Habersham soils are classed as Red-Yellow Podzolic soils, but they do not have a red, well-developed, thick B horizon like that of the Cecil soils. Because of the weak structural development of the thin, discontinuous B horizon and the shallow depth to bedrock, Habersham soils are intergrades toward the Lithosol great soil group.

Louisa soils are Red-Yellow Podzolic soils, but they have some characteristics of Lithosols. Louisa soils have a thinner and redder $A_p$ horizon than the Cecil soils and a thinner, finer textured, more friable B horizon. Also, they are more micaceous than the Cecil soils and much shallower to bedrock. The colors of the B and C horizons of the Louisa soils are on the 10R color chart, whereas the colors of these horizons in the Cecil soils are mainly on the 5YR and 2.5YR color charts. Because the Louisa soils do not have a distinct $A_2$ horizon and a well-defined $B_2$ horizon, and because they are shallow to bedrock, they are considered intergrades between Red-Yellow Podzolic soils and Lithosols.

### *Reddish-Brown Lateritic soils*

Reddish-Brown Lateritic soils are in the zonal soil order. They have a dark reddish-brown, granular surface soil, a red, friable, clay B horizon, and red or reticulately mottled, lateritic parent material. These soils developed under humid tropical climate that has distinct wet and dry seasons. The vegetation was tropical forest.

Hiwassee soils are the only Reddish-Brown Lateritic soils in the county, but they do not strictly conform to the foregoing definition. They did not develop under tropical forest, and their subsoil contains less clay than is typical for the group. The Hiwassee soils are somewhat similar to Red-Yellow Podzolic soils in nature of their clay and in reaction. The clay is mainly kaolinite or vermiculite rather than sesquioxides. But Hiwassee soils do have a dark reddish-brown surface layer and a thick, red, somewhat friable B horizon.

### *Low-Humic Gley soils*

These soils are in the intrazonal soil order. They are imperfectly and poorly drained and have a very thin surface horizon that contains a moderate amount of organic matter. The surface horizon is underlain by mottled, gray and brown horizons that have little textural differentiation (*4*).

Worsham soils, which cover less than 1 percent of the county, are the only Low-Humic Gleys in the county. They have a thin, dark-gray surface layer and are strongly gleyed and strongly acid.

Because the 21- to 31-inch layer of the Worsham soils is firm and has characteristics of a pan, the Worsham soils are sometimes considered intergrades between Low-Humic Gleys and Planosols. Planosols are intrazonal soils that have an eluviated A horizon and a B horizon that is more strongly illuviated, cemented, or compacted than that of the associated normal soils. Planosols have developed in nearly level uplands under grass or forest vegetation in a humid or subhumid climate (*5*).

### *Alluvial soils*

Alluvial soils are in the azonal soil order. They are developing from alluvium that has been recently deposited and shows little or no evidence of modification by the soil-forming processes (*4*).

In Forsyth County, the soils of five series—Buncombe, Chewacla, Congaree, Seneca, and Wehadkee—are in the Alluvial great soil group. These soils are susceptible to

overflow. Their horizonation ranges from none in the very recently deposited materials to weak in the materials that were deposited much earlier. All of these soils except the Buncombe soil show some indication of structural development.

Buncombe loamy fine sand is the only Buncombe soil mapped in Forsyth County. This soil is somewhat excessively drained and light colored and is underlain by sand and gravel.

Chewacla silt loam is the only Chewacla soil mapped in Forsyth County. This soil is moderately well drained to somewhat poorly drained. It is better drained than the Chewacla soils that occur outside of the county and are gleyed at a depth of about 15 inches. In this county, the Chewacla soil differs from the Congaree soils mainly in being mottled below a depth of about 14 inches and in having darker and more friable underlying materials.

Congaree soils are well-drained soils and have a distinct brown color and friable consistence.

Seneca fine sandy loam is the only Seneca soil mapped in the county. This soil is grayer than the Congaree soils and more variable in color and in thickness of the profile. The Seneca soil also varies more in texture within the profile.

Wehadkee silt loam is the only Wehadkee soil mapped in the county. This is an Alluvial soil, but it is poorly drained and shows some effects of gleying. Although there is evidence of some reduction and transfer of iron, the horizons are faint and almost lacking. Consequently, the Wehadkee soil is considered a wet Alluvial soil rather than a Low-Humic Gley. Unless drainage is greatly improved, however, Wehadkee soil can be expected to develop into a Low-Humic Gley as the horizons continue to form.

### *Lithosols*

Lithosols are in the azonal soil order. They consist of freshly weather rock fragments that have no clearly expressed soil morphology. They generally occur on steep slopes (*4*).

Louisburg soils are the only Lithosols in Forsyth County. These soils are on the steeper parts of the upland where geologic erosion has more nearly kept pace with the soil formation than it has in the less sloping areas. Consequently, these soils have less well developed profiles than have soils in the less sloping areas. Louisburg soils have a thinner solum than have the Red-Yellow Podzolic soils and a less bleached $A_2$ horizon. Also, the B layer has not developed or it is thin and discontinuous.

## *General Nature of the Area*

This section was prepared for those not familiar with the county. It discusses geology, physiography, climate, industries, community facilities, and other subjects of general interest.

### Geology, Physiography, and Drainage

Forsyth County is in the middle and upper parts of the Piedmont province (*1*) just south of the Appalachian Mountains. The county is underlain by both igneous and metamorphic rocks. Most of the rocks are metamorphic —gneiss, schist, and quartzite. The geologic formations in the county are shown in figure 11 (*2*). The wide belt of biotite gneiss and schist (cgn) that extends through the central part of the county contains many narrow belts of quartzite.

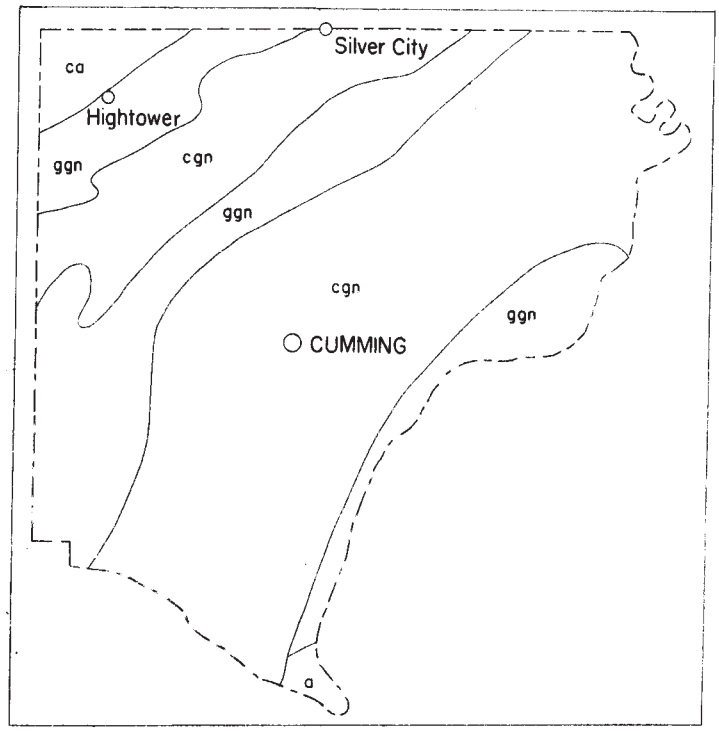


***Figure 11.*—Geologic formations in Forsyth County, Ga.: *cgn*, biotite gneiss and schist; *ggn*, granite and gneiss; *ca*, Ashland schist; *a*, recent alluvium.**

Most of the county is gently sloping to sloping; the northern part is more strongly sloping than the southern part. Suwanee Mountain extends in a northeast-southwest direction in the central part of the county. It has an elevation above sea level of 1,967 feet, the highest in the county. The lowest elevation, less than 900 feet, is where the Chattahoochee River crosses the southern boundary of the county. The average elevation is about 1,100 feet. Deep ravines have been cut by the Chattahoochee and Etowah Rivers.

Except in some small areas on bottom lands, the soils are well drained. The Etowah River and its tributaries drain the northwestern corner of the county. The rest of the county is drained by the Chattahoochee River and its tributaries.

### Climate

Forsyth County has a humid, continental climate. Although complete temperature and precipitation records are not available for any place in the county, the data in table 5 for Gainesville, in adjacent Hall County, are representative of the area.

The average date of the last killing frost in spring at Gainesville is April 4, and that of the first killing frost in fall is October 30. The average frost-free period is 209 days. In some years truck crops and fruit are

TABLE 5.—*Temperature and precipitation at Gainesville, Hall County, Georgia*

[Elevation, 1,245 feet]

| Month | Temperature [1] | | | Precipitation [2] | | | |
|---|---|---|---|---|---|---|---|
| | Average | Absolute maximum | Absolute minimum | Average | Driest year (1904) | Wettest year (1929) | Average snowfall |
| | ° F. | ° F. | ° F. | Inches | Inches | Inches | Inches |
| December | 42. 8 | 75 | 1 | 5. 27 | 1. 88 | 2. 36 | 0. 8 |
| January | 41. 8 | 79 | −1 | 5. 15 | 3. 27 | 5. 26 | 1. 2 |
| February | 43. 4 | 79 | −6 | 5. 51 | 1. 96 | 9. 72 | 1. 1 |
| Winter | 42. 7 | 79 | −6 | 15. 93 | 7. 11 | 17. 34 | 3. 1 |
| March | 51. 3 | 88 | 6 | 5. 90 | 4. 50 | 12. 60 | . 3 |
| April | 59. 3 | 93 | 22 | 4. 09 | 1. 49 | 4. 55 | (3) |
| May | 67. 8 | 98 | 33 | 3. 81 | 2. 68 | 7. 22 | (3) |
| Spring | 59. 5 | 98 | 6 | 13. 80 | 8. 67 | 24. 37 | . 3 |
| June | 75. 0 | 107 | 41 | 4. 23 | 1. 42 | 6. 46 | 0 |
| July | 77. 6 | 107 | 49 | 5. 42 | 1. 60 | 9. 15 | 0 |
| August | 76. 4 | 104 | 49 | 5. 26 | 2. 03 | 1. 29 | 0 |
| Summer | 76. 3 | 107 | 41 | 14. 91 | 5. 05 | 16. 90 | 0 |
| September | 71. 5 | 103 | 35 | 3. 73 | . 34 | 12. 26 | 0 |
| October | 60. 8 | 95 | 20 | 2. 99 | . 12 | 4. 82 | (3) |
| November | 50. 1 | 86 | 4 | 3. 23 | 2. 22 | 7. 23 | . 1 |
| Fall | 60. 8 | 103 | 4 | 9. 95 | 2. 68 | 24. 31 | . 1 |
| Year | 59. 8 | 107 | −6 | 54. 59 | 23. 51 | 82. 92 | 3. 5 |

[1] Average temperature based on a 65-year record, through 1955; highest and lowest temperatures on a 69-year record, through 1952.
[2] Average precipitation based on a 71-year record, through 1955; wettest and driest years based on a 71-year record, in the period 1875–1955; snowfall based on a 51-year record, through 1952.
[3] Trace.

damaged by frost late in spring. Frost has occurred as early as October 9 and as late as April 21.

The temperature is very changeable in winter (*5*). Most nights in December, January, and February have temperatures below freezing, but the temperature during the day is very rarely below freezing. Some winter days are quite warm. Summer days are long and hot, but summer nights are generally cool.

The annual precipitation at Cumming is about 53 inches. Snow, which is not common, rarely covers the ground deeper than 1 inch. Floods are common from December through April, and they may occur at other times after periods of heavy rainfall. The two peaks of rainfall are in winter and in midsummer. A dry period extends from late in midsummer until late in fall. Some damage to crops is caused by droughts and by extended rains in spring that delay planting. Although electrical storms are common, they seldom cause serious damage.

Winter is mild enough to allow some winter cover crops to be grown. The growing season is long enough to permit a good growth of cover that can be turned under in time for another crop to be planted and to mature before a killing frost arrives. A well-managed pasture is productive for 8 to 10 months, but native grasses on unimproved pasture are seldom productive for more than 5 or 6 months. The ground is seldom frozen, and the soil can be plowed and a seedbed prepared in winter if the moisture content of the soil is satisfactory.

## Water Supply

The Chattahoochee and Etowah Rivers and many small streams furnish enough surface water to supply the county. The distribution of this water has been extended by the construction of many farm ponds. The ponds are used to supply water for the growing livestock industry. A 12,000-acre reservoir will be created when Buford Dam is completed and Lake Sidney Lanier is filled with water. The reservoir is located on the Chattahoochee River near the point where Forsyth, Hall, and Gwinnett Counties meet. It will provide a large source of water for this section of the county.

## Industries

The main industries in Forsyth County—broiler processing and lumbering—are related to agriculture. Farmers of the county raise chickens and sell them to broiler-processing plants. Some supplies and equipment for the broiler industry are supplied locally.

The principal forest products are various kinds of lumber, mainly saw timber. Most of the timber is sawed by small mobile mills. Because transportation facilities were lacking and markets were remote, timber was not cut to be sold until after agriculture had developed. The pulp industry is small, but it is growing larger. In 1954, forest products in the county were sold for about $83,000.

## Transportation, Markets, and Communications

Although there are no railroads in the county, railroads at Gainesville, Buford, and Canton are all within 25 miles of Cumming. The county is served by a network of paved roads. The main buying centers are Cumming, Coal Mountain, and Silver City. The principal markets for products of the county are Gainesville and Atlanta. The county has telephone service and television reception from three large networks.

## Organization, Settlement, and Population

Forsyth County was formed from part of the land ceded by the Cherokee Indians in 1832. In that year, the county was organized and Cumming, the county seat, was founded. Except for the Suwanee Mountain, all of the county is now settled. Lake Sidney Lanier is the only area that is not privately owned.

After the discovery of gold in the southern part of the Appalachian Mountains in 1830, the number of white settlers increased rapidly. In 1836, the Indians were moved and the area was opened for settlement. Under a lottery plan, each settler was assigned a 40-acre tract. Many of these tracts were in remote locations or on undesirable land, but most of the settlers tried to farm the land assigned to them. Others were interested in gold. Within 15 years after the initial settlement, the settlers began to leave the county.

The rather sparse population of Forsyth County has changed very little since 1930. In that year the population was 10,632, and by 1940 it had increased to 11,322.

By 1950, however, the population had decreased to 11,005. All of the people in the county are classed as rural. Cumming, the largest town, had a population of 1,264 in 1950.

## Community Facilities

All sections of the county are served by elementary and secondary schools. Because the number of school children is small in some sections, many schools are consolidated and the pupils are taken to them by bus. The county has churches of several denominations and a mobile library. There is a modern hospital at Cumming. When the Buford Dam is completed and Lake Sidney Lanier is filled, facilities for boating, fishing, and swimming will be available.

# *Agriculture*

Before the white settlers arrived, the Cherokee Indians lived in small, permanent homes and did some farming. The Indians did not depend entirely on the crops they grew, because fish, game, and wild fruit were important items in their diet. Corn, beans, and potatoes were the main crops; some tobacco was also grown. The Indians used horses and oxen to farm the first bottoms and terraces.

After the Indians were removed, the white settlers began to clear the land and extend farming. By 1935, there were 142,759 acres in farms, but the acreage in farms has decreased since 1935. In 1940, there were 133,192 acres in farms; in 1950, 135,169 acres; and in 1954, 115,928 acres. Cropland harvested has decreased from 46,303 acres in 1934 to 19,981 acres in 1954. In 1954, 13,155 acres of cropland lay idle and 6,512 acres of cropland was pastured. Other pasture in the county totaled 23,615 acres.

## Crops

Table 6 gives the acreage of the principal crops for stated years and the number of bearing fruit and nut trees. During recent years there has been a decrease in the acreage of wheat, rye, cotton, and sweet sorghum and an increase in acreage of oats, pasture, and hay. Much of the oats and other small grain that has been grown in recent years has been cut for hay. Most of these changes have taken place within the last 25 years. Much oats, pasture, and hay is needed to feed the increasing number of livestock in the county.

TABLE 6.—*Acreage of principal crops and number of bearing fruit and nut trees in stated years*

| Crop | 1939 | 1949 | 1954 |
|---|---|---|---|
| | *Acres* | *Acres* | *Acres* |
| Corn for all purposes | 22, 494 | 15, 779 | 10, 159 |
| Cotton harvested | 14, 514 | 9, 299 | 2, 387 |
| Oats, threshed | 1, 484 | 1, 201 | 1, 182 |
| Wheat, threshed | 1, 382 | 1, 116 | 827 |
| All hay except sorghum | 1, 933 | 3, 089 | 3, 602 |
| Sorghum for all purposes except for sirup | 507 | 139 | 89 |
| Cowpeas grown for all purposes except processing | 8, 054 | 541 | 339 |
| | *Number* [1] | *Number* [1] | *Number* |
| Peach trees | 18, 979 | 6, 159 | 2, 470 |
| Apple trees | 12, 382 | 6, 009 | 3, 597 |
| Pear trees | 1, 266 | 441 | 213 |
| Cherry trees | 1, 616 | 291 | 108 |
| Pecan trees | 159 | 762 | 657 |

[1] Number in the census year, which is 1 year later than crop year given at head of column.

## Livestock

Table 7 gives the number of livestock in the county in stated years. The number of cattle and calves has increased in recent years, but more significant is the increase in the number of chickens. More chickens are raised to supply the growing broiler processing industry.

TABLE 7.—*Livestock of all ages on farms in stated years*

| Livestock | 1940 | 1950 | 1954 |
|---|---|---|---|
| | *Number* | *Number* | *Number* |
| Horses and colts | [1] 131 | 354 | 325 |
| Mules and mule colts | [1] 2, 479 | 1, 687 | 823 |
| Cattle and calves | [1] 3, 601 | 4, 599 | 7, 556 |
| Hogs and pigs | [2] 2, 407 | 4, 907 | 5, 569 |
| Chickens sold | 372, 675 | 5, 875, 482 | 11, 227, 343 |
| Chickens | [2] 52, 485 | [2] 83, 439 | [2] 156, 766 |

[1] Over 3 months old. [2] Over 4 months old.

## Sizes and Types of Farms

In 1954, there were 1,735 farms in the county by actual count. The average-sized farm was 66.8 acres. About 13.5 percent of the farms were less than 10 acres in size, about 40.0 percent were between 10 and 49 acres, about 29.1 percent were between 50 and 99 acres, and about 16.5 percent were between 100 and 499 acres. Nine farms were between 500 and 999 acres in size, and 3 were more than 1,000 acres.

In 1954, of an estimated number of 1,713 farms in the county, 571 farms were miscellaneous and unclassified. The remaining estimated farms were listed by type as follows:

| | *Number* |
|---|---|
| Poultry | 940 |
| Field crop other than vegetable and fruit and nut | 130 |
| Vegetable | 15 |
| Fruit and nut | 1 |
| Livestock other than dairy and poultry | 21 |
| Dairy | 5 |
| General | 30 |

## Farm Tenure

In 1954, about 68 percent of the farms in the county were operated by full owners and about 7 percent were operated by part owners. The rest of the farms were operated mainly by tenants, although 4 farms were operated by managers.

Of the 412 tenants who operated farms in the county in 1954, 109 paid cash rent and 104 paid for the use of the land by giving the owner a share of the crops or livestock. There were 130 croppers in the county, and 7 who paid for the use of the land partly in cash and partly in products. Croppers are more closely supervised

than share tenants, and they generally have all of the work power furnished by the landlord. Normally, the land that a cropper cultivates is part of a larger enterprise.

## Farm Power and Mechanical Equipment

In Forsyth County, the number of farms without work power is large because about 60 percent of the farms are poultry farms. Poultry farms do not need work power so much as other farms. In 1954, 740 farms in the county reported having no tractors, horses, or mules. There were 541 tractors reported on 507 farms, and 773 motor-trucks reported on 737 farms. Grain combines were reported on 51 farms, and corn pickers on 5 farms. Pickup hay balers were reported on 16 farms, and milking machines on 15 farms.

## Farm Improvements

In 1954, electricity was reported on 1,668 farms and telephones on 492 farms. Farms having television sets numbered 1,077, and those having piped running water numbered 1,317. Home freezers were reported on 192 farms.

# *Glossary*

**Acidity.** The degree of acidity of the soil mass expressed in pH values or in words as follows (*6*):

| | *pH* |
|---|---|
| Extremely acid | Below 4.5. |
| Very strongly acid | 5.5–5.0. |
| Strongly acid | 5.1–5.5. |
| Medium acid | 5.6–6.0. |
| Slightly acid | 6.1–6.5. |
| Neutral | 6.6–7.3. |
| Mildly alkaline | 7.4–7.8. |
| Moderately alkaline | 7.9–8.4. |
| Strongly alkaline | 8.5–9.0. |
| Very strongly alkaline | 9.1 and higher. |

**Alluvial soils.** An azonal group of soils, developed from transported and relatively recently deposited material (alluvium), characterized by weak or no modification of the original material by soil-forming processes.

**Alluvium.** Fine material, such as sand, mud, or other sediments, deposited on land by streams.

**Bedrock.** Solid rock underlying soils.

**Catena, soil.** A group of soils, within a specific soil zone, and formed from similar parent materials, but with unlike soil characteristics that have resulted from differences in relief or drainage (*7*).

**Clay.** The small mineral soil grains less than 0.002 mm. (0.000079 in.) in diameter. The term "clay" also applies to soil that contains 40 percent or more of clay, less than 45 percent of sand, and less than 40 percent of silt.

**Colluvium.** Mixed deposits of soil material and rock fragments near the base of rather steep slopes. The deposits have accumulated through creep, slides, and local wash.

**Consistence.** The degree of cohesion and adhesion of soil particles or their resistance to separation or deformation of the soil aggregate. Terms commonly used to describe consistence are *brittle, compact, friable, firm, soft, hard, plastic,* and *sticky.*

*Brittle*—Soil breaks with a sharp, clean fracture; if struck with a sharp blow, it shatters into cleanly broken, hard fragments.

*Compact*—Dense and firm but without cementation.

*Friable*—Consistence of moist soil; soil material crushes easily between thumb and forefinger and coheres when pressed together.

*Firm*—Consistence of moist soil; soil material crushes with moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

*Soft*—Consistence of dry soil; soil material is very weakly coherent and fragile and breaks to powder or individual grains under very slight pressure.

*Hard*—Consistence of dry soil; soil material is moderately resistant to pressure; can be broken in hands without difficulty but is barely breakable between thumb and forefinger.

*Plastic*—Consistence of wet soil; soil material will form a "wire" when rolled in the hands and can be deformed under moderate pressure.

*Sticky*—Consistence of wet soil; after pressure, soil material adheres to both thumb and forefinger and tends to stretch.

**Eluviation.** The movement of material, in solution or in suspension, from one place to another within the soil. Horizons that have lost material through eluviation are said to be eluvial; those that have received material are illuvial. With an excess of rainfall over evaporation, eluviation may take place downward or sidewise according to the direction of water movement. The term refers especially to the movement of soil colloids in suspension; leaching refers to the removal of materials such as salt in solution (*7*).

**Erosion.** The wearing away or removal of soil material by water or wind.

**Fertility, soil.** The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other factors such as light, moisture, temperature, and the physical condition of the soil are favorable.

**First bottom.** The normal flood plain of a stream; land along a stream subject to overflow.

**Genesis, soil.** Mode of origin of the soil, with special reference to the processes responsible for the development of the solum (horizons A and B) from the unconsolidated parent material.

**Horizon, soil.** A layer in the soil profile, approximately parallel to the land surface and having well-defined characteristics.

*Horizon, A*—The upper horizon of the soil mass from which material has been removed by percolating waters; the eluviated part of the solum; the surface soil. This horizon is generally divided into two or more subhorizons, of which $A_0$ is not a part of the mineral soil but the accumulation of organic debris on the surface. Other subhorizons are designated as $A_1$, $A_2$, and so on.

*Horizon, B*—The horizon to which materials have been added by percolating water; the illuviated part of the solum; the subsoil. This horizon may be divided into several subhorizons, depending on the color, structure, consistence, and other characteristics of the material deposited. These subhorizons are designated as $B_1$, $B_2$, $B_3$, and so on.

*Horizon, C*—The horizon of partly weathered material underlying the B horizon; the substratum; usually the parent material.

**Illuviation.** An accumulation of material in a soil horizon through the deposition of suspended mineral and organic matter originating from horizons above.

**Leaching.** Removal of materials in solution.

**Lithosols.** An azonal group of soils having no clearly expressed soil morphology and consisting of a freshly and imperfectly weathered mass of rock fragments. Lithosols are largely confined to steeply sloping land.

**Morphology, soil.** The constitution of the soil, including the texture, structure, porosity, consistence, color, and other physical, chemical, and biological properties of the various soil horizons that make up the soil profile.

**Mottles, soil.** Contrasting color spots or patches that vary in number and size.

**Normal soil.** A soil having a profile in near equilibrium with its environment; developed under good but not excessive drainage from parent material of mixed mineral, physical, and chemical composition. The characteristics of a normal soil express the full effects of climate and living matter.

**Permeability, soil.** The quality of a soil horizon that enables water or air to move through it.

**Phase, soil.** The subdivision of the soil type that is based on those departures from the typical soil characteristics that are not sufficient to justify establishment of a new type but are worthy of recognition and the forming of a mapping unit. The variations are chiefly in external characteristics such as relief, stoniness, and erosion.

**Productivity.** The capability of a soil to produce specified plants under a given system of management.

**Profile, soil.** A vertical section of the soil through all its horizons and extending into the parent material.

**Reaction.** See Acidity.

**Sand.** Small rock or mineral fragments, from 0.05 mm. (0.002 in.) to 1.0 mm. (0.039 in.) in diameter. The term "sand" also applies to soils containing 85 percent or more of sand and not more than 10 percent of clay.

**Series, soil.** A group of soils having the same profile characteristics except for texture of the surface soil. They have the same general range in color, structure, consistence, and sequence of horizons, and the same general conditions of relief and drainage. Usually they are of common or similar origin and mode of formation.

**Silt.** Small mineral grains ranging from 0.05 mm. (0.002 in.) to 0.002 mm. (0.000079 in.) in diameter. The term "silt" also applies to soil that contains 80 percent or more of silt and less than 12 percent of clay.

**Soil.** An organized natural body on the surface of the earth characterized by conformable layers that are the result of modification of parent material by physical, chemical, and biological forces through various periods of time; the natural medium for the growth of land plants.

**Solum.** The upper part of the soil profile, above the parent material, in which the processes of soil formation are taking place. In mature soils the solum consists of the A and B horizons. Usually the characteristics of the material in these horizons are quite unlike those of the underlying parent material. The living roots and other plant and animal life are largely confined to the solum.

**Structure, soil.** The aggregates in which the individual soil particles are arranged. It may refer to their natural arrangement in the soil when in place or disturbed. Soil structure is classified according to grade, class, and type.

*Grade*—Degree of distinctnes of aggregation; expresses the differential between cohesion within aggregates and adhesion between aggregates. Terms: Structureless (single grain or massive), weak, moderate, and strong.

*Class*—Size of soil aggregates. Terms: Very fine or very thin, fine or thin, coarse or thick, and very coarse or very thick.

*Type*—Shape of soil aggregates. Terms: Platy, prismatic, columnar, blocky, granular (nonporous), and crumb (porous). Example of soil-structure grade, class, and type: Moderate, coarse, blocky.

**Subsoil.** Technically, the B horizon; commonly, that part of the profile below plow depth.

**Substratum.** The material underlying the subsoil.

**Surface soil.** Technically, the A horizon; commonly, that part of the upper profile usually stirred by plowing.

**Terrace** (geologic). Old alluvial plain, usually level or smooth, bordering a stream; seldom subject to overflow. A terrace is sometimes called a second bottom.

**Texture, soil.** The relative proportion of the various size groups of individual soil grains in a mass of soil. Specifically it refers to the proportion of sand, silt, and clay. A coarse-textured soil is one with a high sand content; a fine-textured soil has a large proportion of clay.

**Type.** A subdivision of the soil series based on the texture of the surface soil.

**Upland** (geologic). Land consisting of material unworked by water in recent geologic time and ordinarily lying at higher elevations than the alluvial plain or stream terrace.

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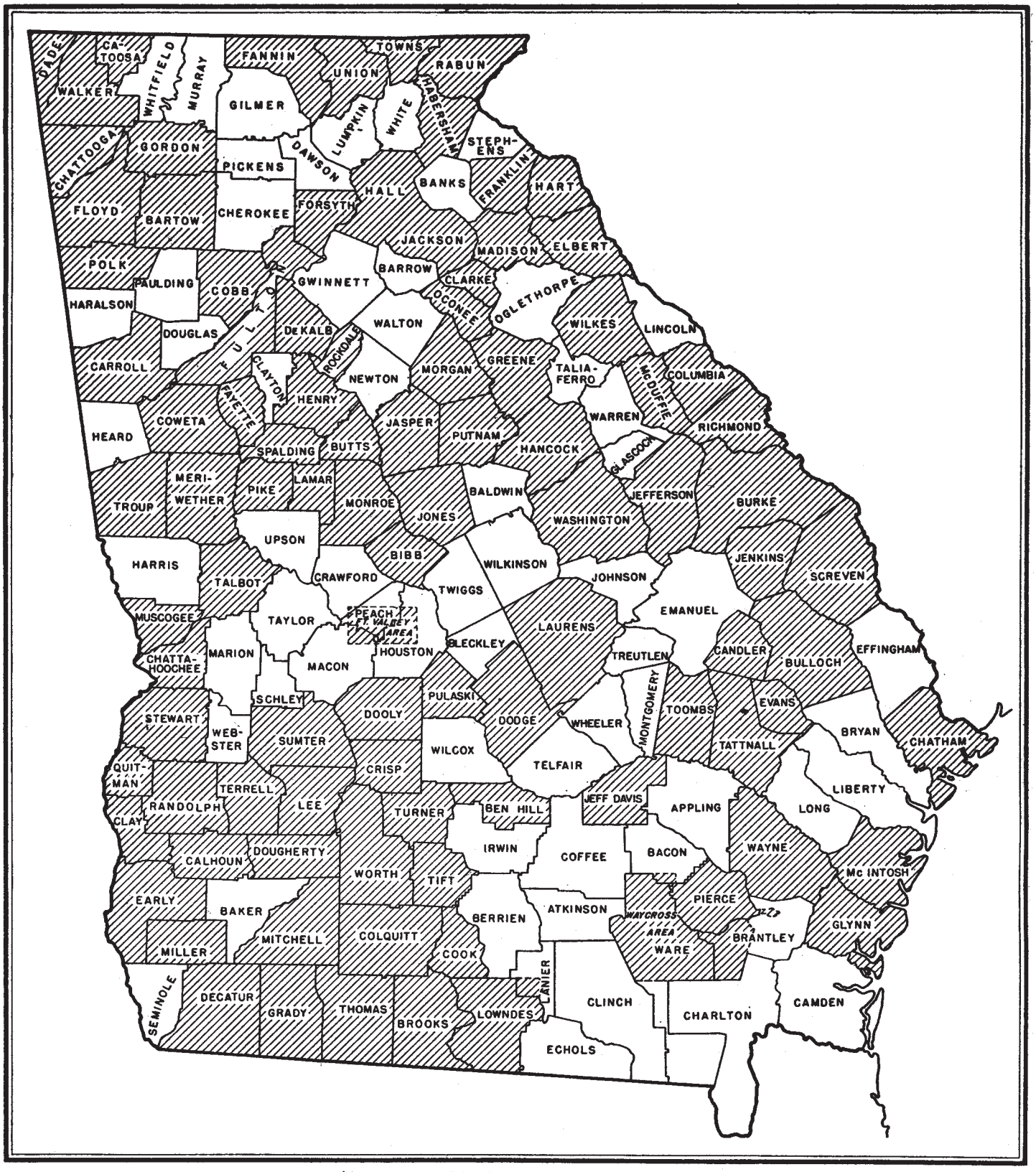


**Areas surveyed in Georgia shown by shading.**

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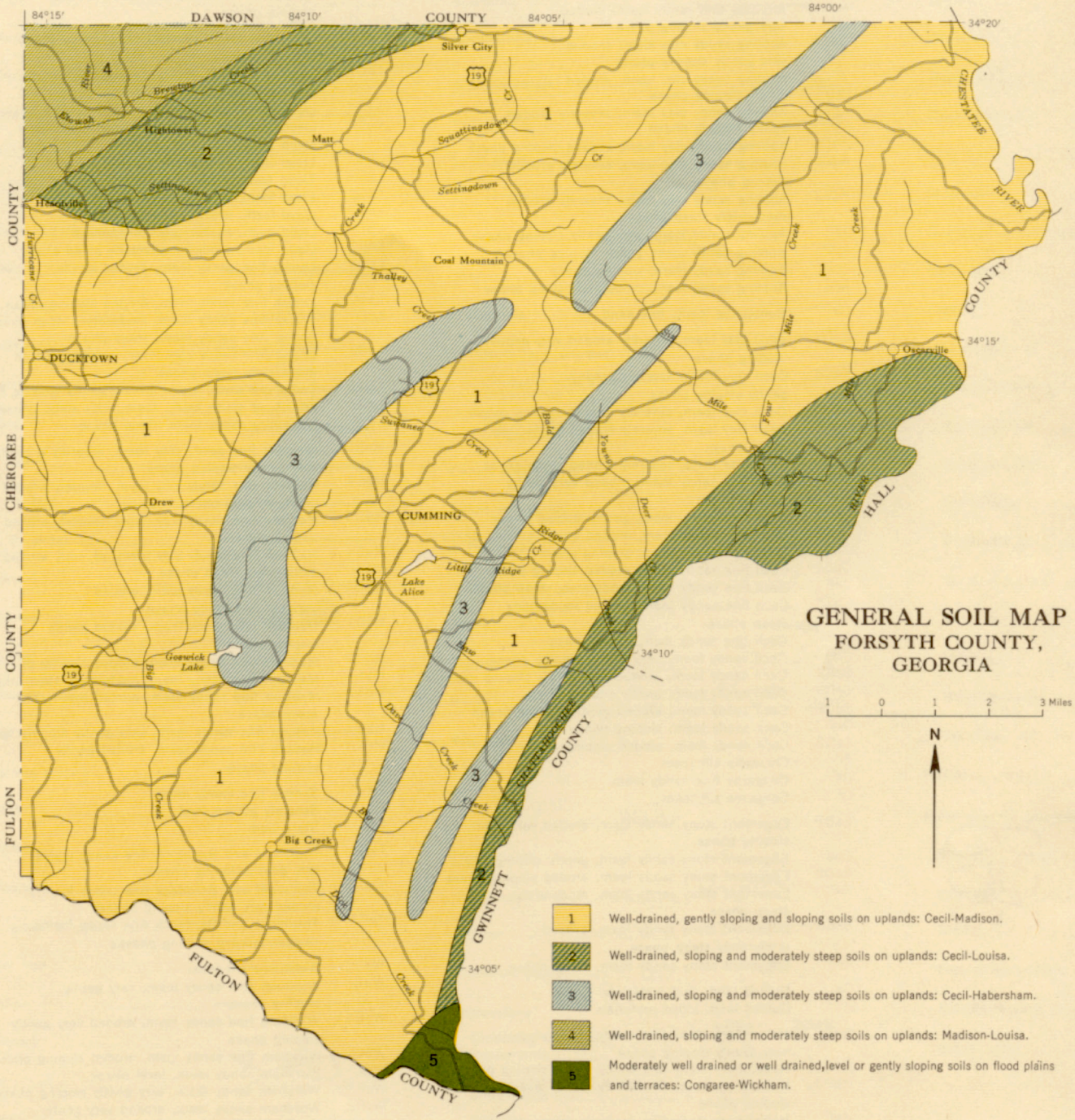
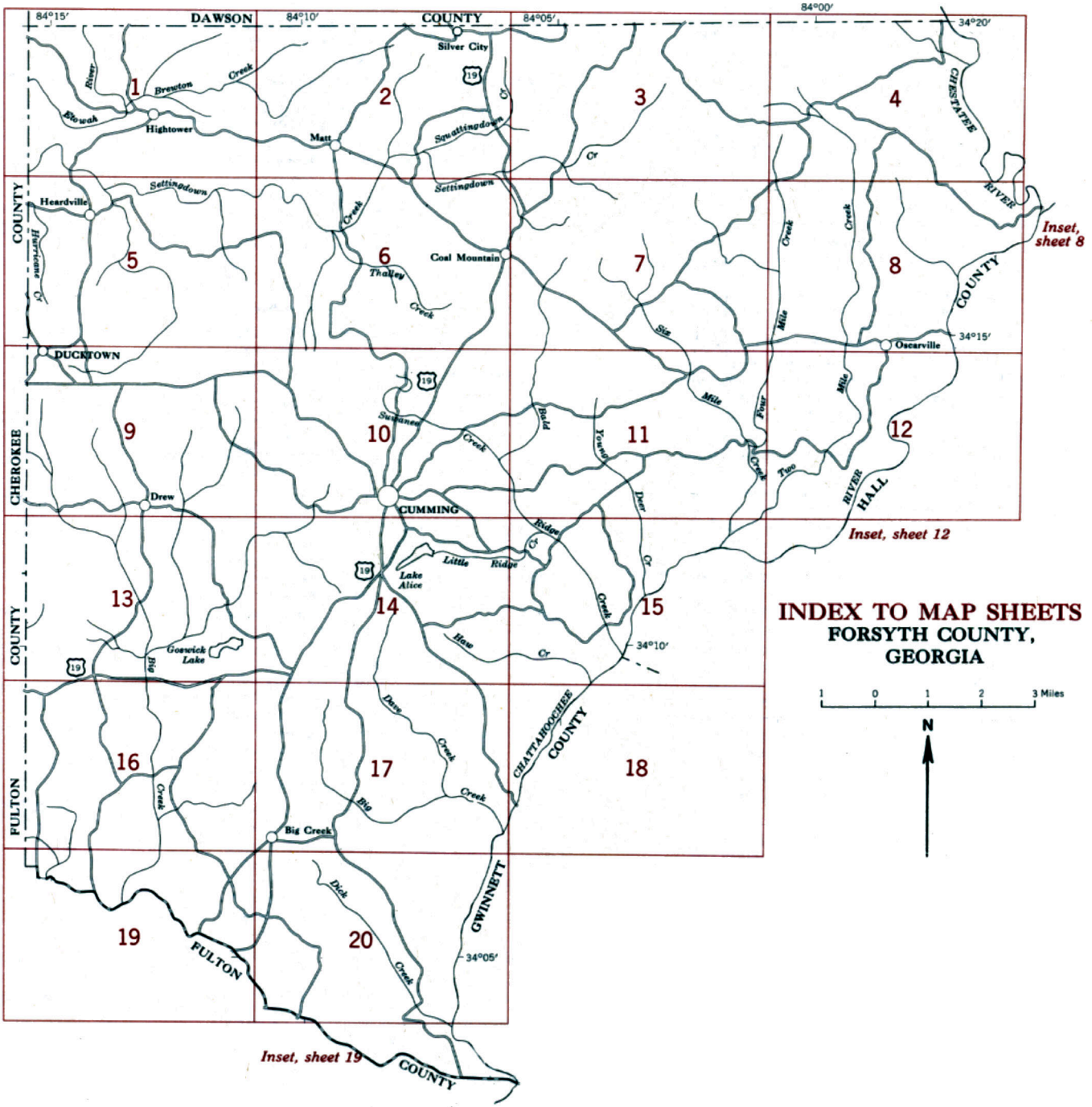

GENERAL SOIL MAP
FORSYTH COUNTY,
GEORGIA
1 0 1 2 3 Miles
N
1 Well-drained, gently sloping and sloping soils on uplands: Cecil-Madison.
2 Well-drained, sloping and moderately steep soils on uplands: Cecil-Louisa.
3 Well-drained, sloping and moderately steep soils on uplands: Cecil-Habersham.
4 Well-drained, sloping and moderately steep soils on uplands: Madison-Louisa.
5 Moderately well drained or well drained, level or gently sloping soils on flood plains and terraces: Congaree-Wickham.
DAWSON COUNTY
CHEROKEE COUNTY
FULTON COUNTY
GWINNETT COUNTY
HALL COUNTY
CHESTATEE RIVER
CHATTAHOOCHEE RIVER
Silver City
Matt
Coal Mountain
DUCKTOWN
Drew
CUMMING
Lake Alice
Goswick Lake
Big Creek
Oscarville
84°15′
84°10′
84°05′
84°00′
34°20′
34°15′
34°10′
34°05′


INDEX TO MAP SHEETS
FORSYTH COUNTY,
GEORGIA
1 0 1 2 3 Miles
N
DAWSON COUNTY
CHEROKEE COUNTY
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GWINNETT COUNTY
CHATTAHOOCHEE RIVER
CHESTATEE RIVER
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Hightower
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Heardville
Coal Mountain
DUCKTOWN
Oscarville
Drew
CUMMING
Lake Alice
Goswick Lake
Big Creek
Inset, sheet 8
Inset, sheet 12
Inset, sheet 19
84°15′
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## SOIL LEGEND

| SYMBOL | NAME |
|---|---|
| Aa | Alluvial land, poorly drained |
| Ab | Alluvial land, moderately well drained |
| AcA | Altavista fine sandy loam, level phase |
| AcB | Altavista fine sandy loam, very gently sloping phase |
| AcB2 | Altavista fine sandy loam, eroded very gently sloping phase |
| AdB2 | Appling sandy clay loam, eroded very gently sloping phase |
| AdC2 | Appling sandy clay loam, eroded gently sloping phase |
| AdC3 | Appling sandy clay loam, severely eroded gently sloping phase |
| AdD2 | Appling sandy clay loam, eroded sloping phase |
| AdD3 | Appling sandy clay loam, severely eroded sloping phase |
| AdE3 | Appling sandy clay loam, severely eroded moderately steep phase |
| AeB | Appling sandy loam, very gently sloping phase |
| AeC | Appling sandy loam, gently sloping phase |
| AeD | Appling sandy loam, sloping phase |
| AeE | Appling sandy loam, moderately steep phase |
| Ba | Buncombe loamy fine sand |
| CaB3 | Cecil clay loam, severely eroded very gently sloping phase |
| CaC3 | Cecil clay loam, severely eroded gently sloping phase |
| CaD3 | Cecil clay loam, severely eroded sloping phase |
| CaE3 | Cecil clay loam, severely eroded moderately steep phase |
| CaF3 | Cecil clay loam, severely eroded steep phase |
| CbB2 | Cecil fine sandy loam, eroded very gently sloping phase |
| CbC | Cecil fine sandy loam, gently sloping phase |
| CbC2 | Cecil fine sandy loam, eroded gently sloping phase |
| CbD | Cecil fine sandy loam, sloping phase |
| CbD2 | Cecil fine sandy loam, eroded sloping phase |
| CbE | Cecil fine sandy loam, moderately steep phase |
| CbE2 | Cecil fine sandy loam, eroded moderately steep phase |
| CbF | Cecil fine sandy loam, steep phase |
| CcB | Cecil sandy loam, very gently sloping phase |
| CcB2 | Cecil sandy loam, eroded very gently sloping phase |
| CcC | Cecil sandy loam, gently sloping phase |
| CcC2 | Cecil sandy loam, eroded gently sloping phase |
| CcD | Cecil sandy loam, sloping phase |
| CcD2 | Cecil sandy loam, eroded sloping phase |
| Cd | Chewacla silt loam |
| Ce | Congaree fine sandy loam |
| Cf | Congaree silt loam |
| EaB2 | Edgemont stony sandy loam, eroded very gently sloping phase |
| EaC | Edgemont stony sandy loam, gently sloping phase |
| EaD2 | Edgemont stony sandy loam, eroded sloping phase |
| EaE | Edgemont stony sandy loam, moderately steep phase |
| EaE2 | Edgemont stony sandy loam, eroded moderately steep phase |
| EaF | Edgemont stony sandy loam, steep phase |
| Ga | Gullied land, acid materials |
| Gb | Gullied land, Lloyd materials |
| HaB2 | Habersham stony fine sandy loam, eroded very gently sloping phase |
| HaD | Habersham stony fine sandy loam, sloping phase |
| HaD3 | Habersham stony fine sandy loam, severely eroded sloping phase |
| HaE | Habersham stony fine sandy loam, moderately steep phase |
| HaE3 | Habersham stony fine sandy loam, severely eroded moderately steep phase |
| HbC2 | Hiwassee fine sandy loam, eroded gently sloping phase |
| HcD2 | Hiwassee fine sandy clay loam, eroded sloping phase |
| LaB3 | Lloyd clay loam, severely eroded very gently sloping phase |
| LaC3 | Lloyd clay loam, severely eroded gently sloping phase |
| LaD3 | Lloyd clay loam, severely eroded sloping phase |
| LaE3 | Lloyd clay loam, severely eroded moderately steep phase |
| LbB | Lloyd loam, very gently sloping phase |
| LbB2 | Lloyd loam, eroded very gently sloping phase |
| LbC2 | Lloyd loam, eroded gently sloping phase |
| LbD2 | Lloyd loam, eroded sloping phase |
| LbE | Lloyd loam, moderately steep phase |
| LbE2 | Lloyd loam, eroded moderately steep phase |
| LcC2 | Louisa fine sandy loam, eroded gently sloping phase |
| LcD2 | Louisa fine sandy loam, eroded sloping phase |
| LcE | Louisa fine sandy loam, moderately steep phase |
| LcF | Louisa fine sandy loam, steep phase |
| LdE3 | Louisa fine sandy clay loam, severely eroded moderately steep phase |
| LeC2 | Louisburg sandy loam, eroded gently sloping phase |
| LeE | Louisburg sandy loam, moderately steep phase |
| LeF | Louisburg sandy loam, steep phase |
| MaB3 | Madison fine sandy clay loam, severely eroded very gently sloping phase |
| MaC3 | Madison fine sandy clay loam, severely eroded gently sloping phase |
| MaD3 | Madison fine sandy clay loam, severely eroded sloping phase |
| MaE3 | Madison fine sandy clay loam, severely eroded moderately steep phase |
| MbB2 | Madison fine sandy loam, eroded very gently sloping phase |
| MbC2 | Madison fine sandy loam, eroded gently sloping phase |
| MbD2 | Madison fine sandy loam, eroded sloping phase |
| MbE | Madison fine sandy loam, moderately steep phase |
| MbE2 | Madison fine sandy loam, eroded moderately steep phase |
| McB | Masada fine sandy loam, very gently sloping phase |
| McC2 | Masada fine sandy loam, eroded gently sloping phase |
| Sa | Seneca fine sandy loam |
| Sb | Severely gullied land |
| Sc | Starr loam |
| TaB | Thurmont and Braddock fine sandy loams, very gently sloping phases |
| TaB2 | Thurmont and Braddock fine sandy loams, eroded very gently sloping phases |
| TaD3 | Thurmont and Braddock fine sandy loams, severely eroded sloping phases |
| Wa | Wehadkee silt loam |
| WbB | Wickham fine sandy loam, very gently sloping phase |
| WbB2 | Wickham fine sandy loam, eroded very gently sloping phase |
| WbD2 | Wickham fine sandy loam, eroded sloping phase |
| WcA | Worsham sandy loam, level phase |
| WcB | Worsham sandy loam, very gently sloping phase |
| WcB2 | Worsham sandy loam, eroded very gently sloping phase |
| WcD3 | Worsham sandy loam, severely eroded sloping phase |

Soils surveyed 1938-56 by Forrest Steele, J. P. Knight, Hugh Davis, C. B. Lawrence, D. D. Baron, and S. M. Robertson, Soil Conservation Service. Correlation by A. H. Hasty, Soil Conservation Service.

Soil map constructed 1958 by Cartographic Division, Soil Conservation Service, USDA, from 1956 aerial photographs. Controlled mosaic based on Georgia plane coordinate system, west zone, transverse Mercator projection, 1927 North American datum.

## CONVENTIONAL SIGNS

### WORKS AND STRUCTURES

Roads
- Good motor
- Poor motor
- Trail
- Marker, U. S. (33)

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail, foot
- Railroad
- Ferry
- Ford
- Grade
- R. R. over
- R. R. under
- Tunnel

Buildings
- School
- Church
- Station

Mine and Quarry
- Shaft
- Dump
- Prospect

Pits, gravel or other

Power line

Pipeline

Cemetery

Dam

Levee

Tank

Oil well

Windmill

Canal lock (point upstream)

Cotton gin

Power station

### BOUNDARIES

- National or state
- County
- Township, civil
- Township, U. S.
- Section line, corner
- City (corporate)
- Reservation
- Land grant

### DRAINAGE

Streams
- Perennial
- Intermittent, unclass.
- Crossable with tillage implements
- Not crossable with tillage implements

Canals and ditches — CANAL, DITCH

Lakes and ponds
- Perennial
- Intermittent

Wells — flowing

Springs

Marsh

Wet spot

### RELIEF

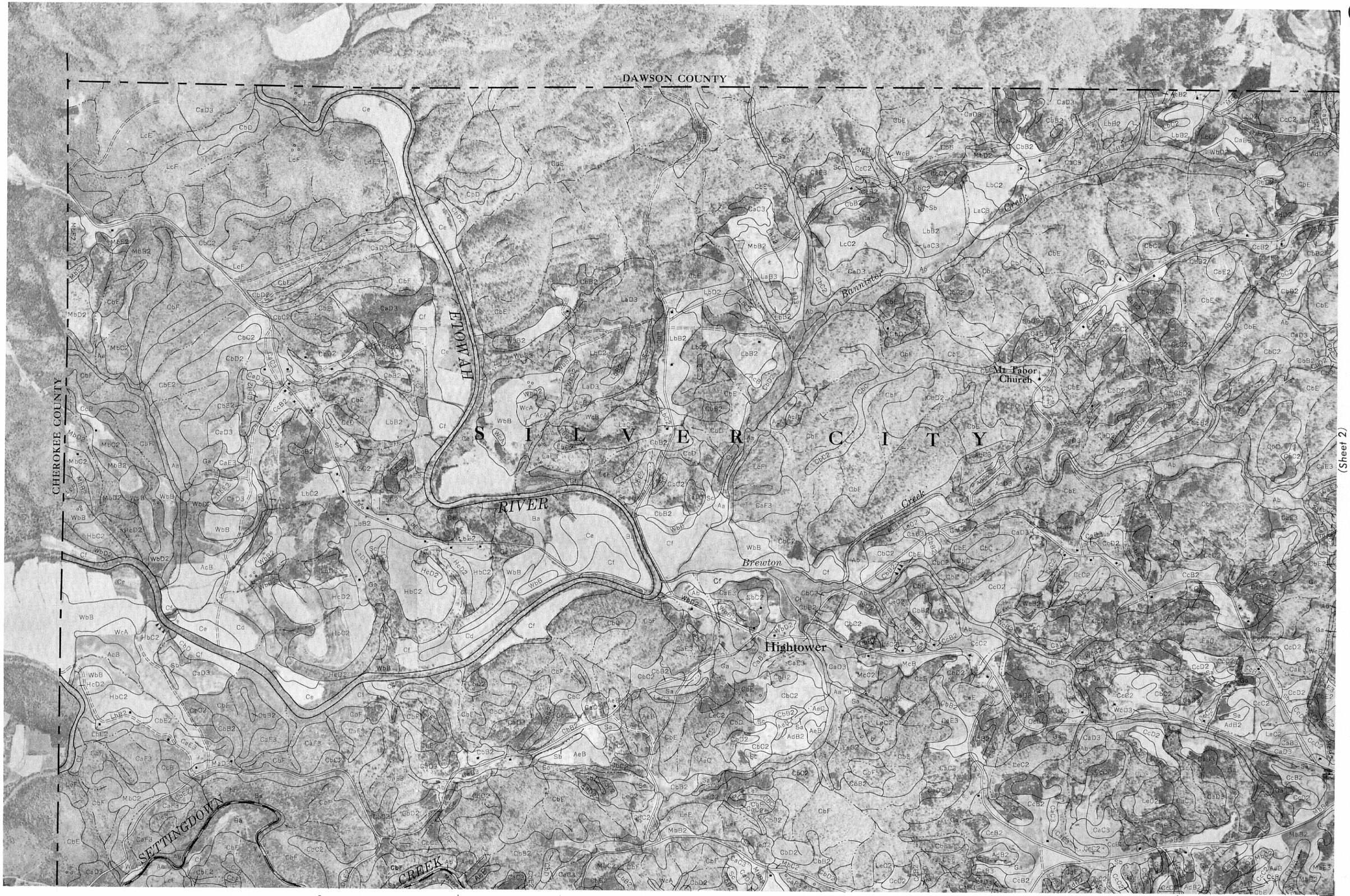
Escarpments
- Bedrock
- Other

Prominent peaks

Depressions (Large, Small)
- Crossable with tillage implements
- Not crossable with tillage implements
- Contains water most of the time

### SOIL SURVEY DATA

- Soil type outline and symbol — Dx
- Gravel
- Stones
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Erosion
  - Uneroded spot — U
  - Sheet, moderate — S
  - Sheet, severe — SS
  - Gully, moderate — G
  - Gully, severe — GG
  - Sheet and gully, moderate — SG
  - Wind, moderate
  - Wind, severe
  - Blowout
  - Wind hummock
  - Overblown soil
- Gullies
- Areas of alkali and salts
  - Strong — A
  - Moderate — M
  - Slight — S
  - Free of toxic effect — F
- Sample location — 26
- Saline spot

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FORSYTH COUNTY, GEORGIA

N

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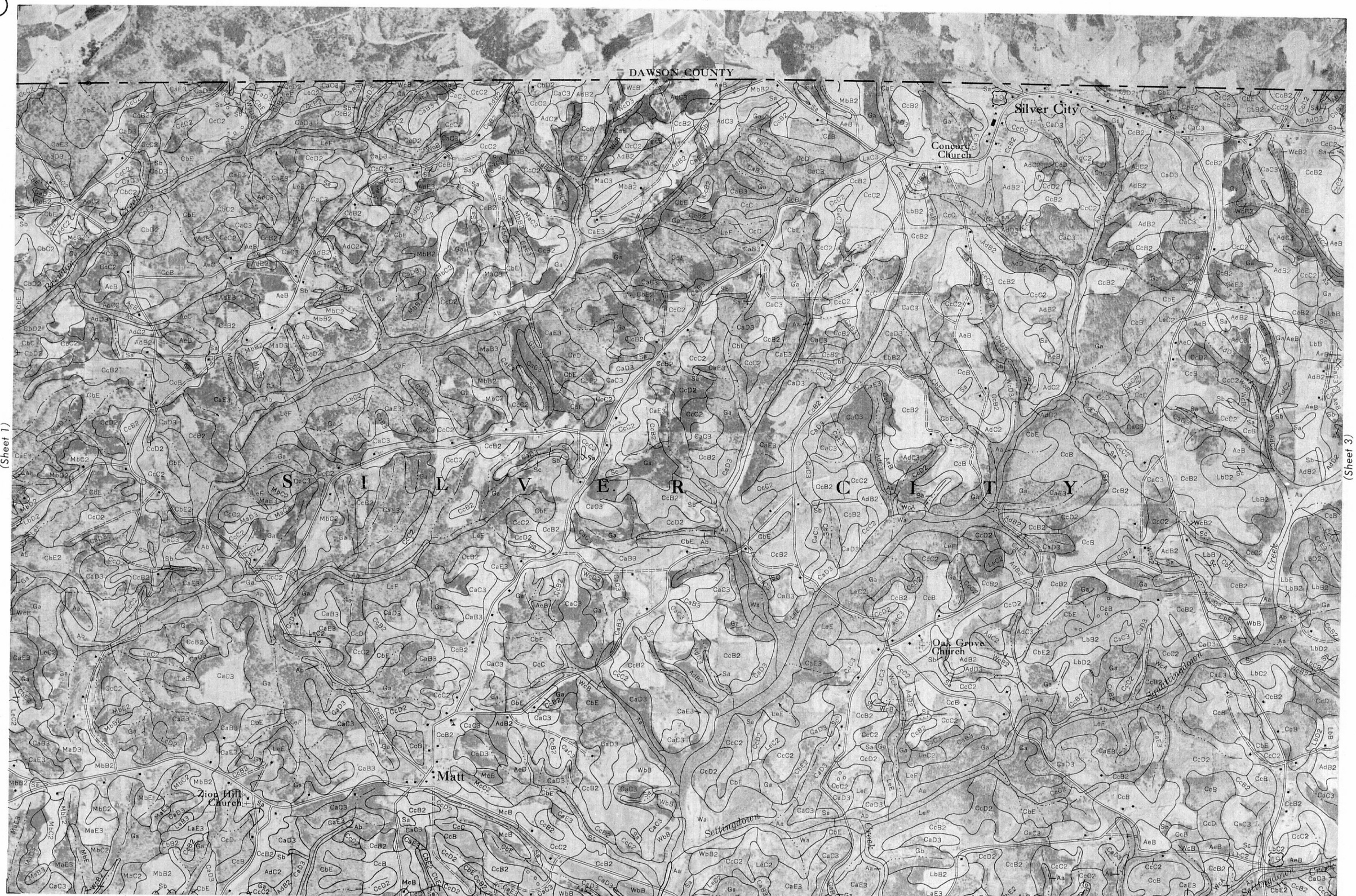


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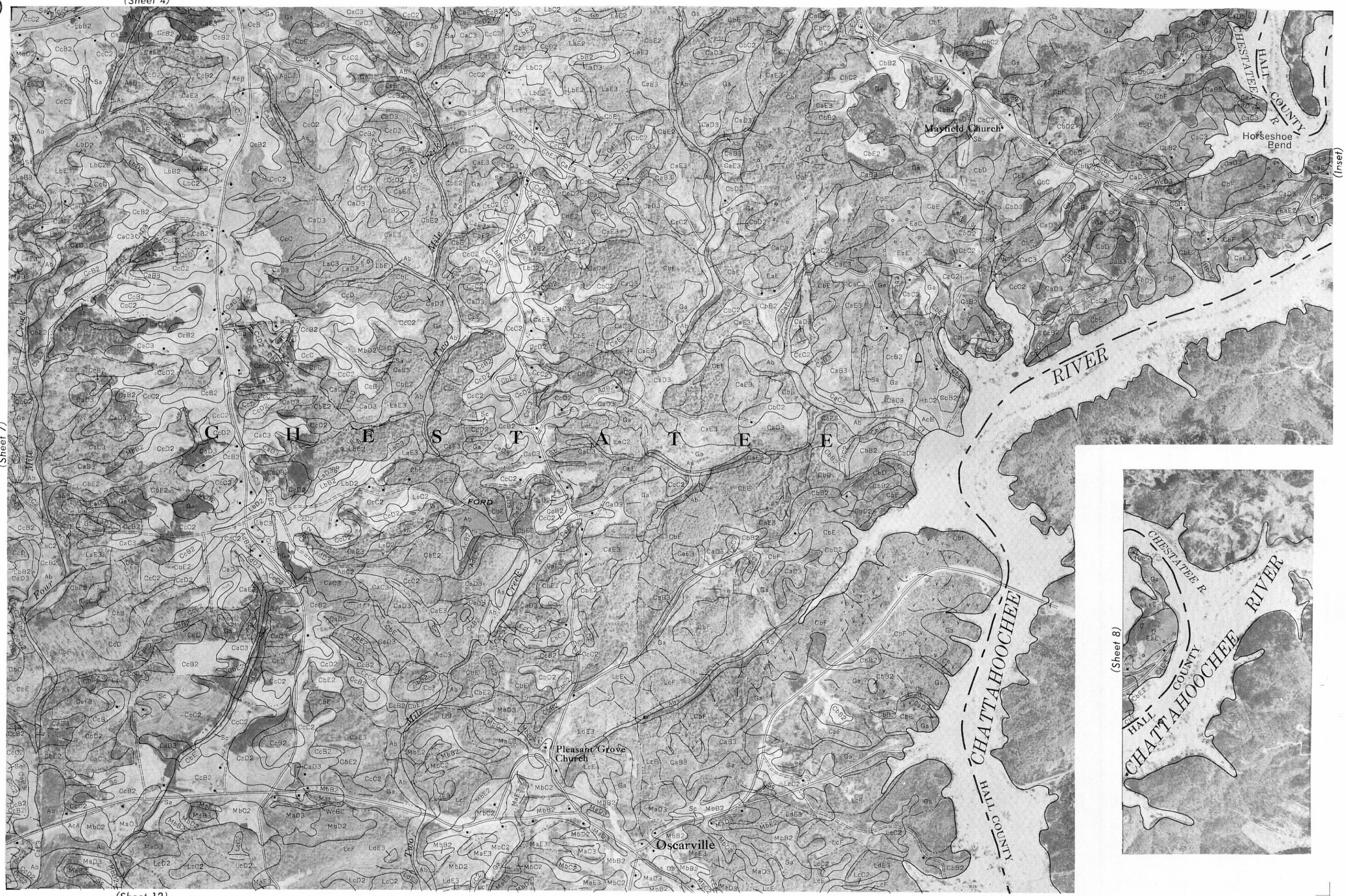


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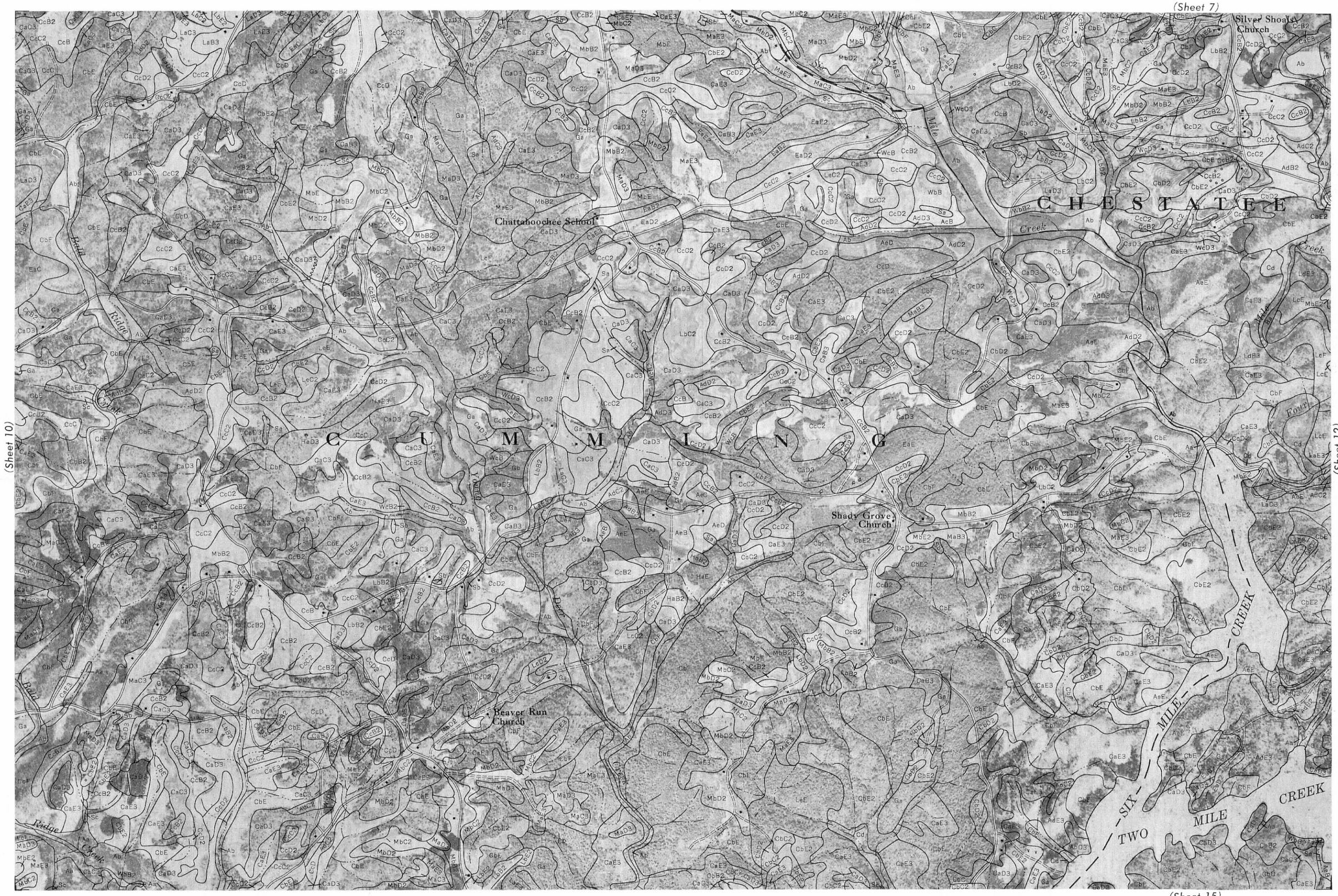


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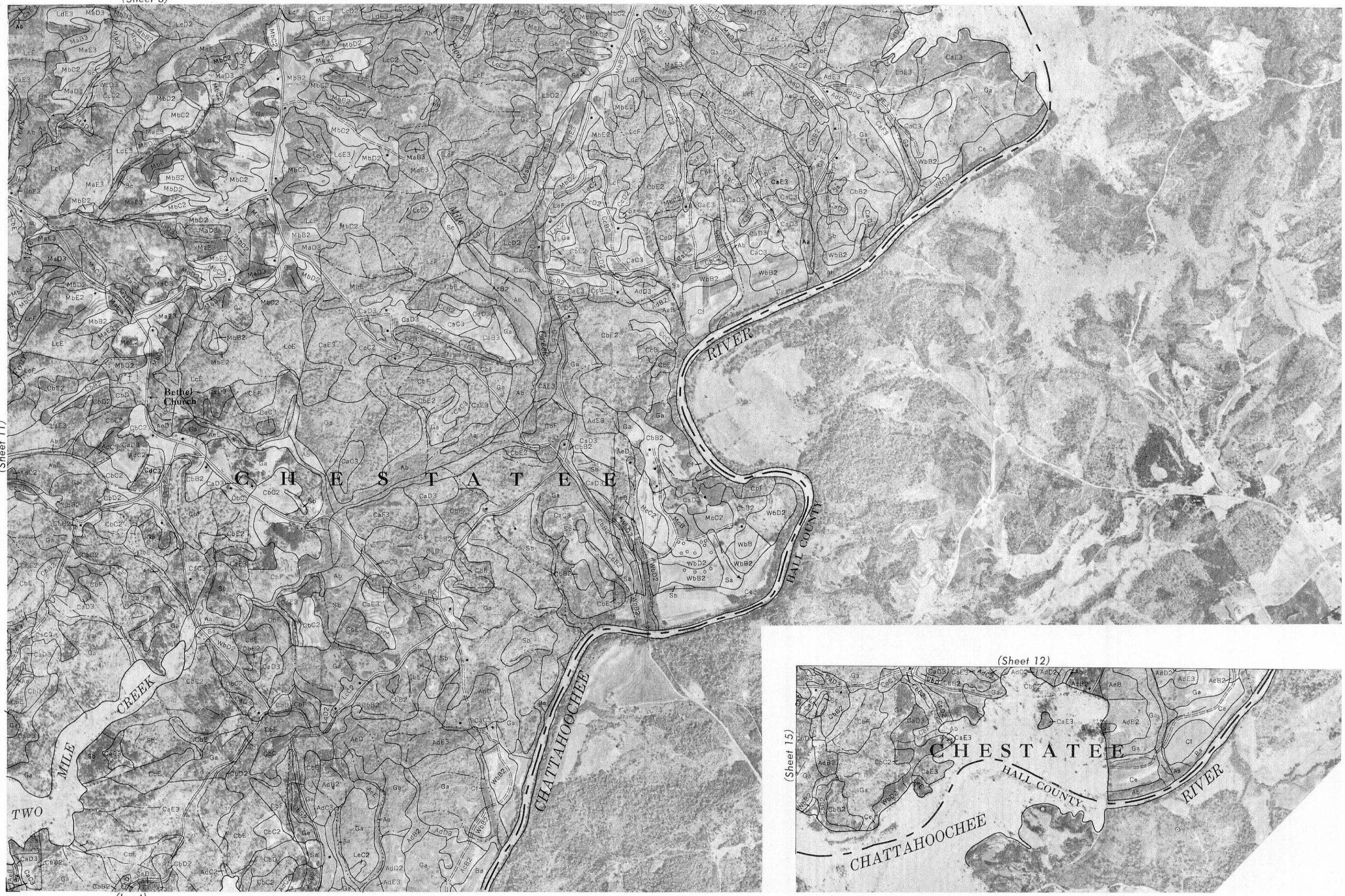


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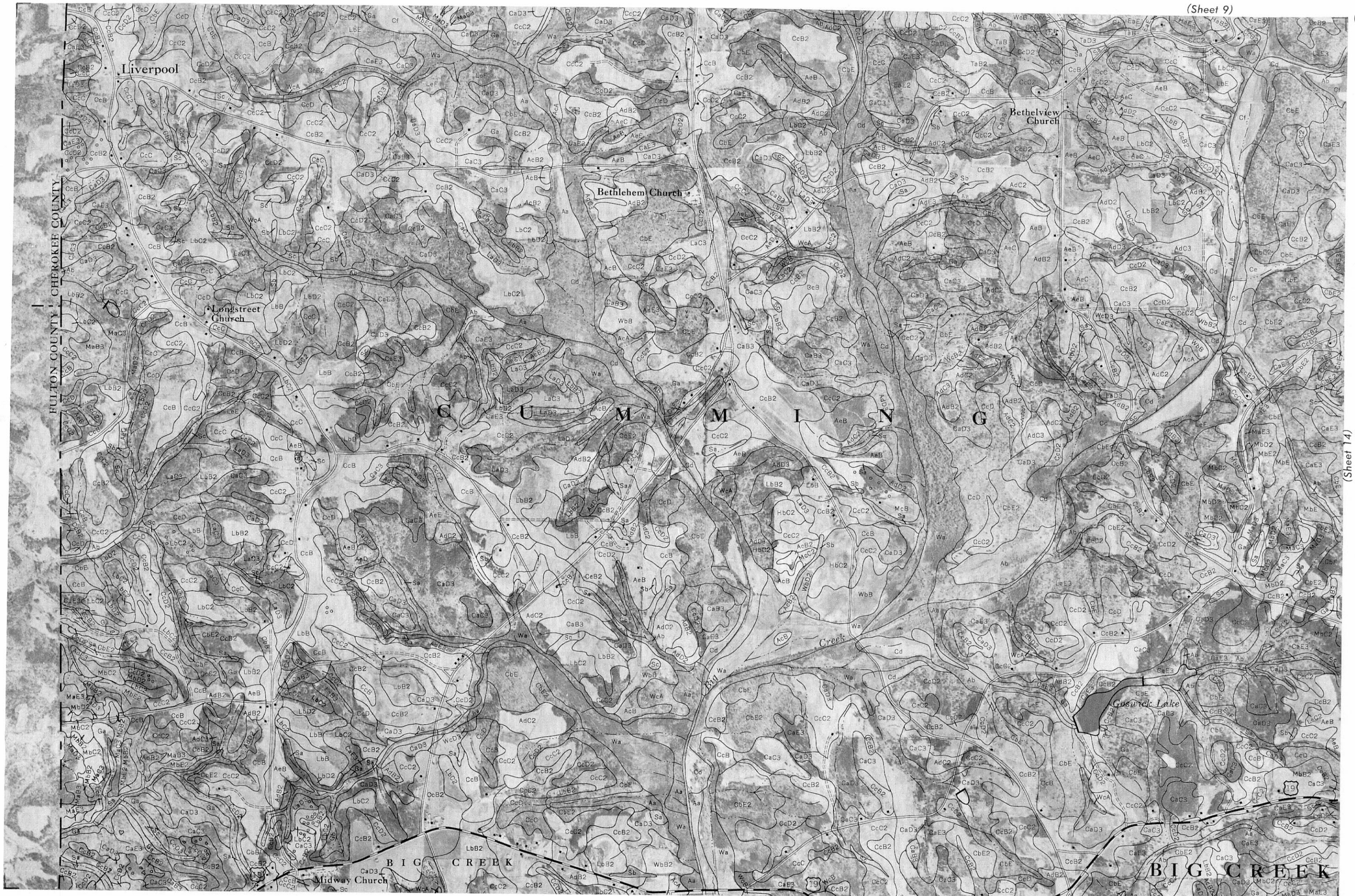


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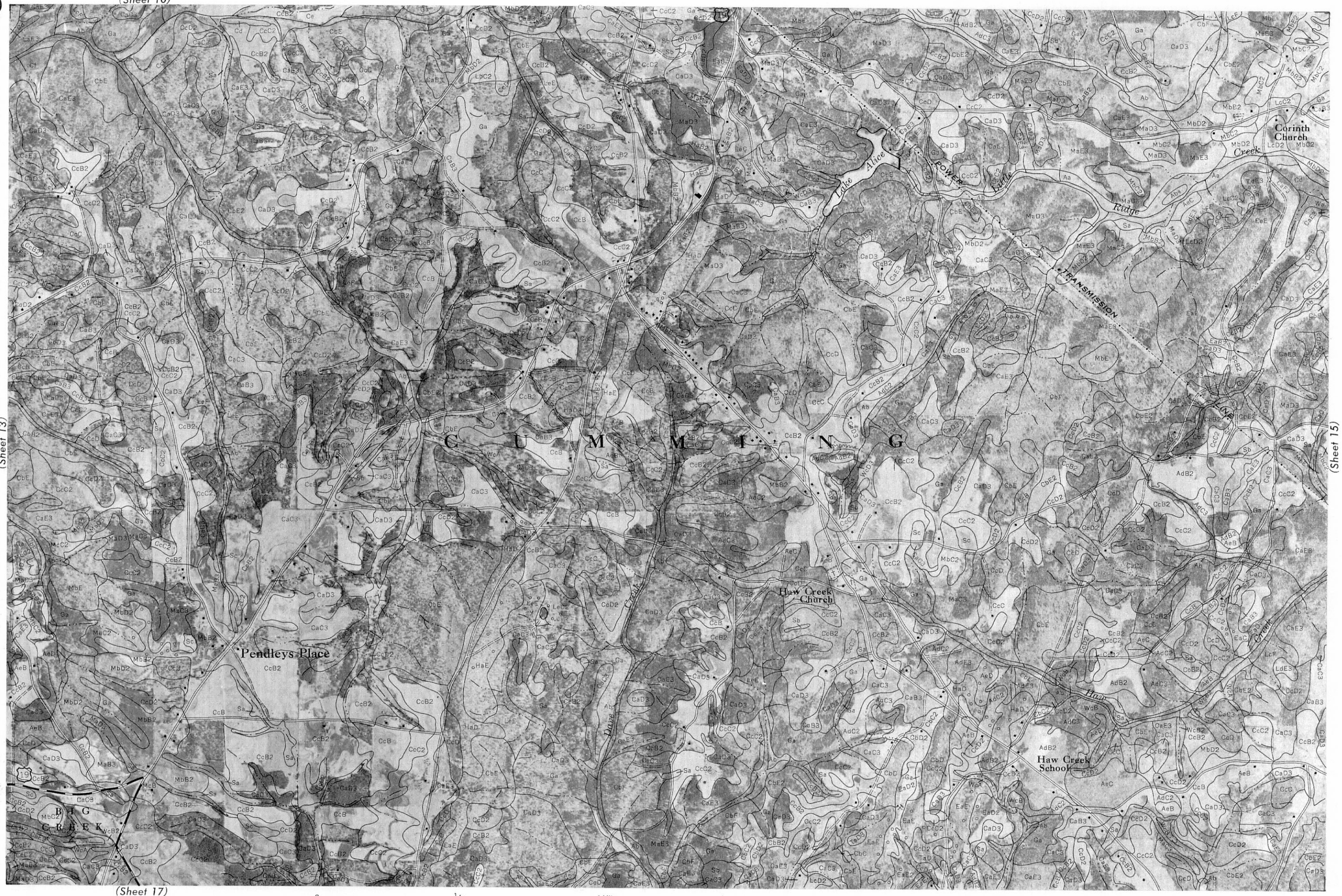


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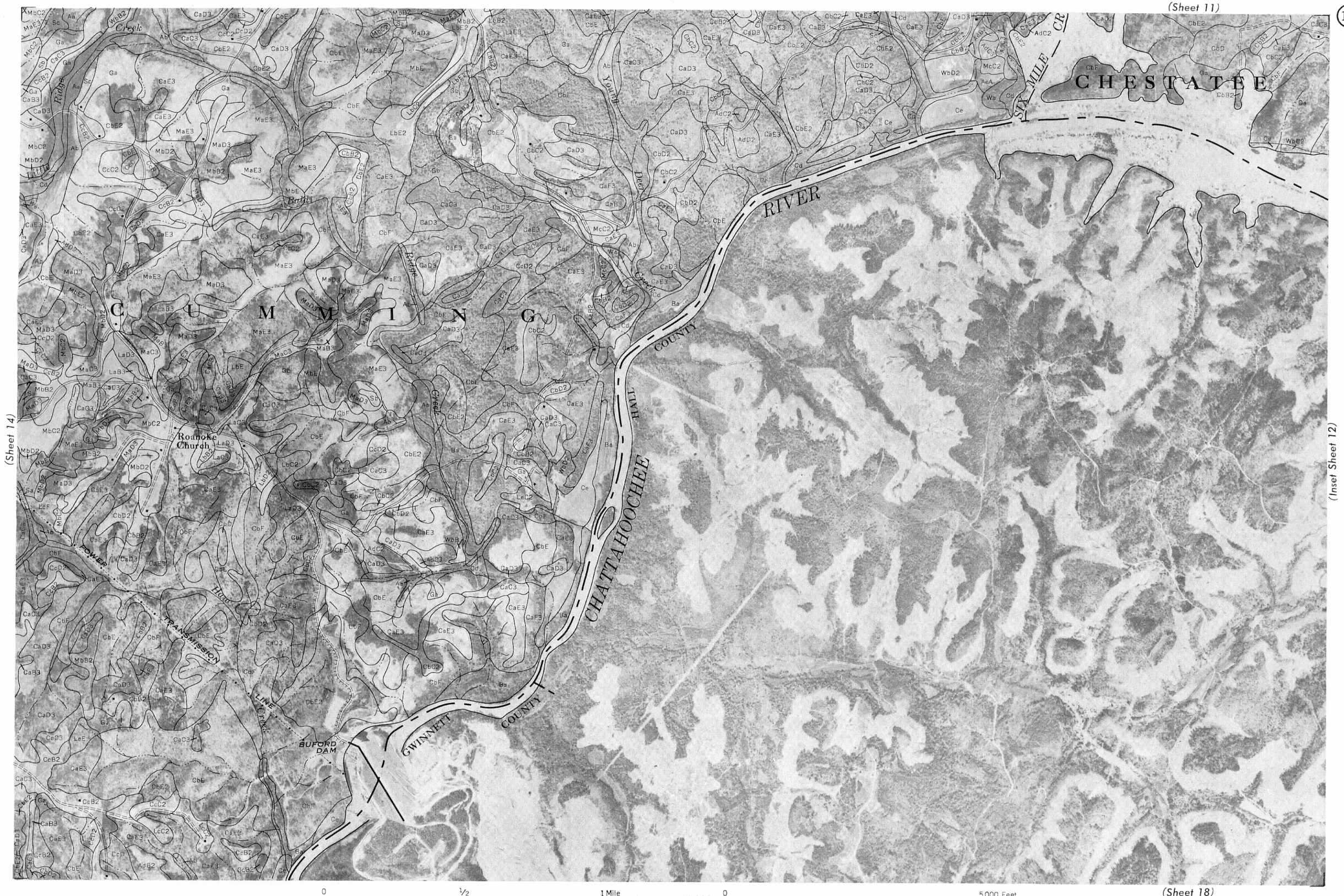


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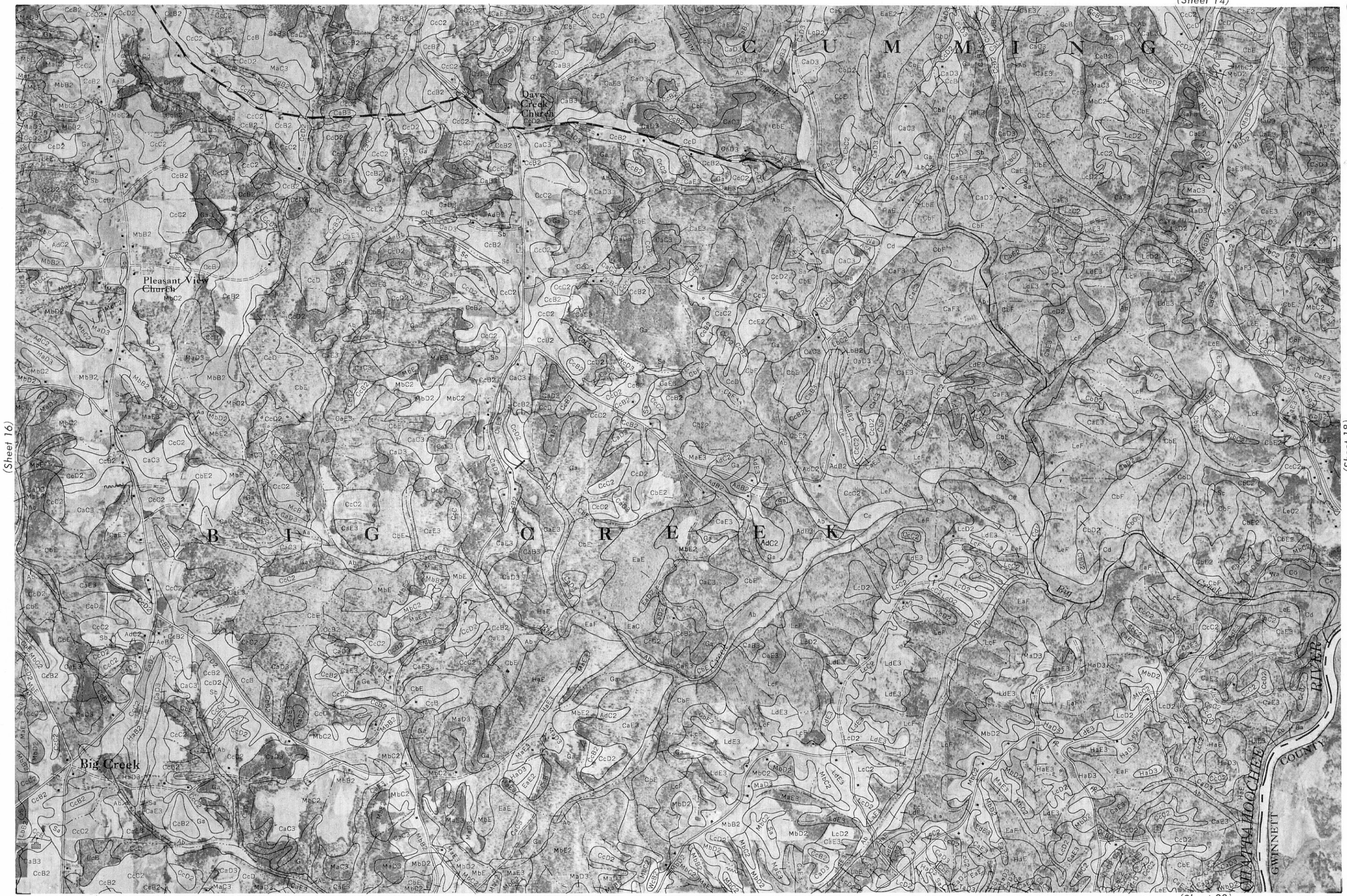


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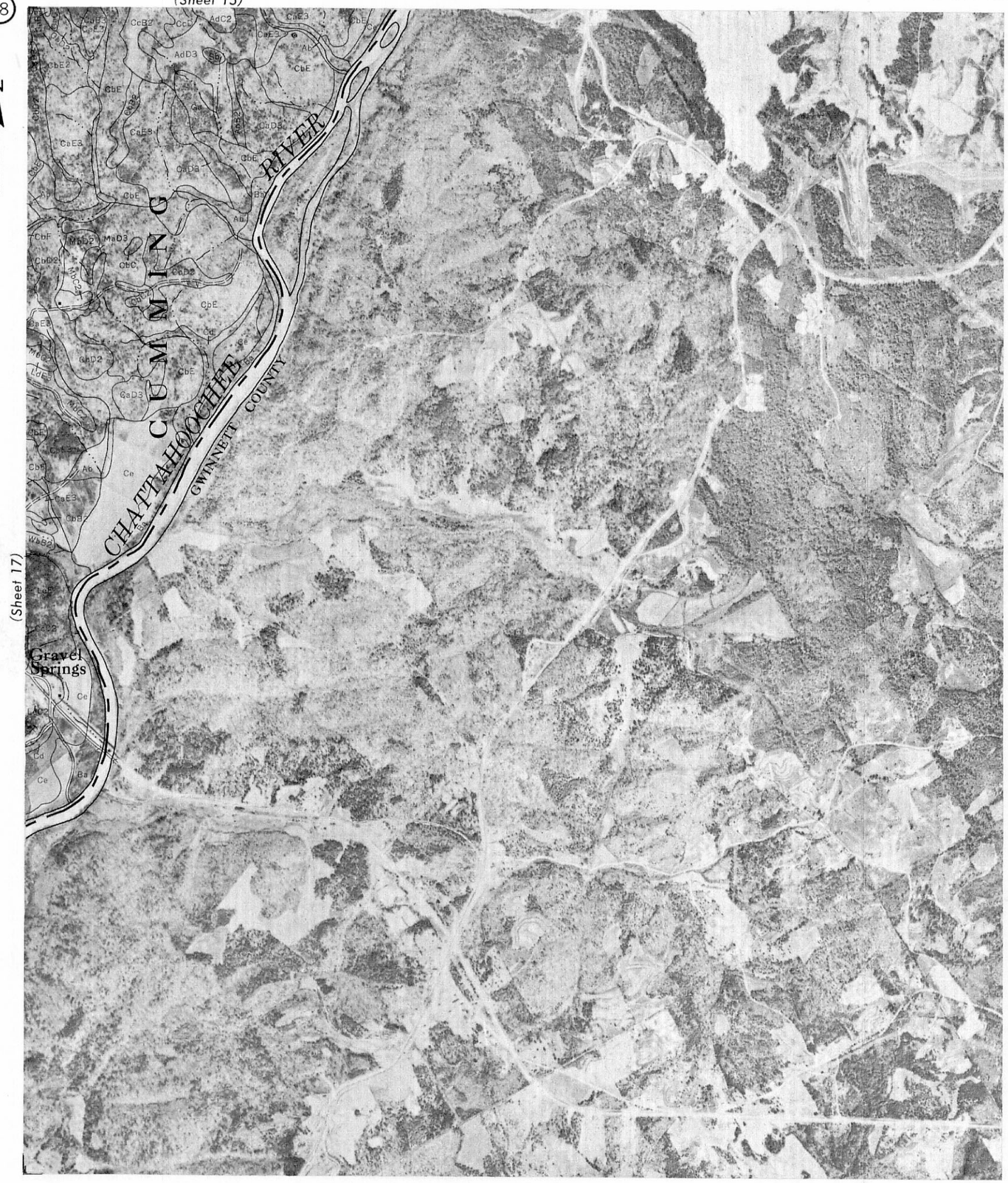


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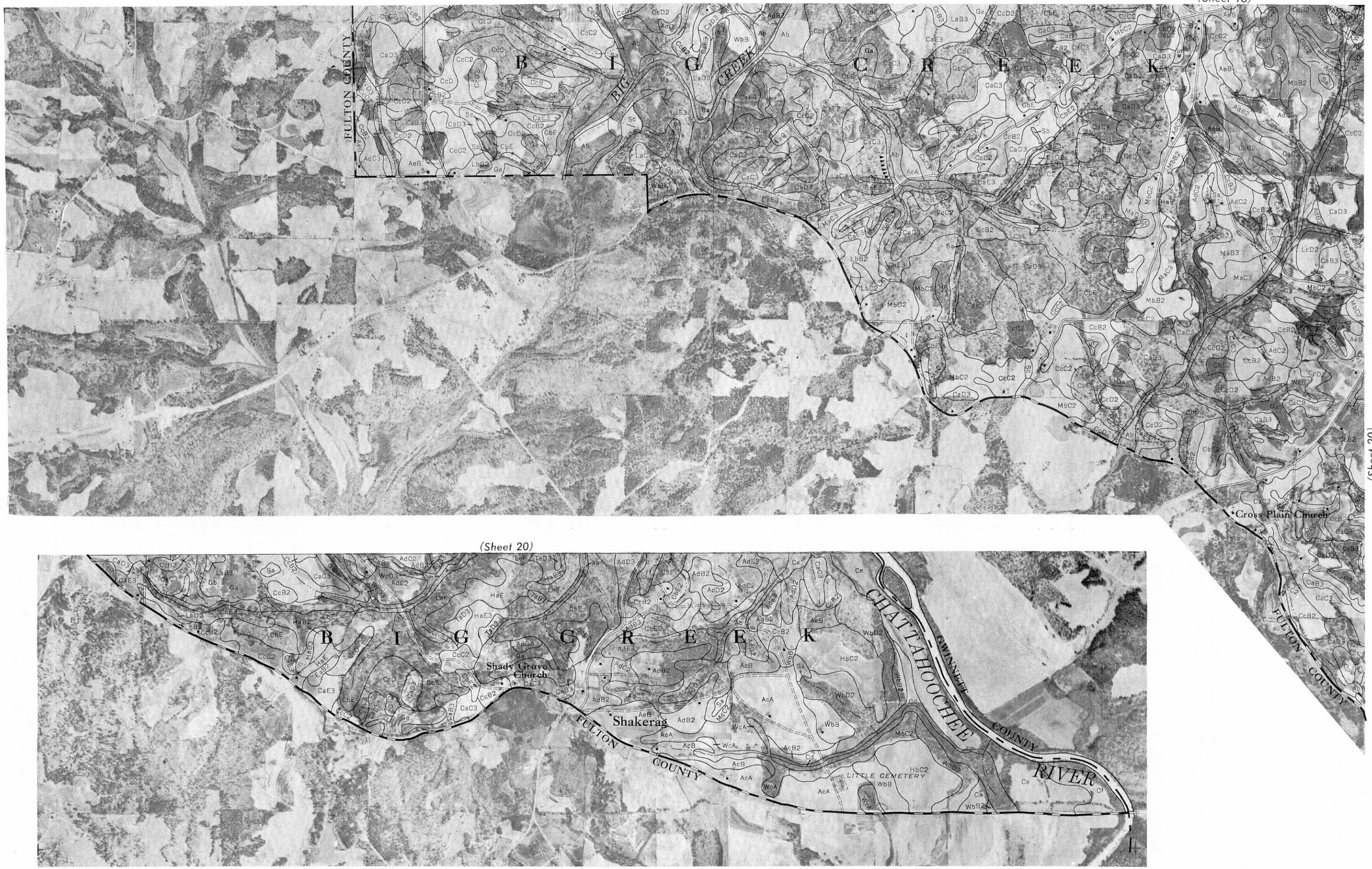


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